

**INTERNATIONAL STANDARDS
AND RECOMMENDED PRACTICES**

**METEOROLOGICAL SERVICE
FOR INTERNATIONAL
AIR NAVIGATION**

ANNEX 3

TO THE CONVENTION ON INTERNATIONAL CIVIL AVIATION

NINTH EDITION — OCTOBER 1983



This edition incorporates all amendments adopted by the Council prior to 11 June 1983 and supersedes, on 22 November 1984, all previous editions of Annex 3.

For information regarding the applicability of the Standards and Recommended Practices, see Foreword.

INTERNATIONAL CIVIL AVIATION ORGANIZATION

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INTERNATIONAL CIVIL AVIATION ORGANIZATION

AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Bulletin* and in the monthly *Supplement to the Catalogue of ICAO Publications*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

RECORD OF AMENDMENTS AND CORRIGENDA

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FOREWORD

Historical background

Standards and Recommended Practices relating to meteorology were first adopted by the Council on 16 April 1948, pursuant to the provisions of Article 37 of the Convention on International Civil Aviation (Chicago, 1944), and designated as Annex 3 to the Convention with the title *Standards and Recommended Practices — Meteorological Codes*. The Standards and Recommended Practices were based on recommendations of the Special Session of the Meteorology Division, held in September 1947.

Table A shows the origin of subsequent amendments, together with a list of the principal subjects involved and the dates on which the Annex and the amendments were adopted or approved by the Council, when they became effective and when they became applicable.

Action by Contracting States

Notification of differences. The attention of Contracting States is drawn to the obligation imposed by Article 38 of the Convention by which Contracting States are required to notify the Organization of any differences between their national regulations and practices and the International Standards contained in this Annex and any amendments thereto. Contracting States are invited to extend such notification to any differences from the Recommended Practices contained in this Annex, and any amendments thereto, when the notification of such differences is important for the safety of air navigation. Further, Contracting States are invited to keep the Organization currently informed of any differences which may subsequently occur, or of the withdrawal of any differences previously notified. A specific request for notification of differences will be sent to Contracting States immediately after the adoption of each Amendment to this Annex.

Attention of States is also drawn to the provisions of Annex 15 related to the publication of differences between their national regulations and practices and the related ICAO Standards and Recommended Practices through the Aeronautical Information Service, in addition to the obligation of States under Article 38 of the Convention.

Promulgation of information. The establishment and withdrawal of and changes to facilities, services and procedures affecting aircraft operations provided in accordance with the Standards and Recommended Practices specified in this Annex should be notified and take effect in accordance with the provisions of Annex 15.

Use of the text of the Annex in national regulations. The Council, on 13 April 1948, adopted a resolution inviting the attention of Contracting States to the desirability of using in their own national regulations, as far as is practicable, the precise language of those ICAO Standards that are of a regulatory character and also of indicating departures from the Standards, including any additional national regulations that are important for the safety or regularity of air navigation. Wherever possible, the provisions of this Annex have been written in such a way as would facilitate incorporation, without major textual changes, into national legislation.

Status of Annex components

An Annex is made up of the following component parts, not all of which, however, are necessarily found in every Annex; they have the status indicated:

1.—Material comprising the Annex proper:

- a) *Standards and Recommended Practices* adopted by the Council under the provisions of the Convention. They are defined as follows:

Standard: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as necessary for the safety or regularity of international air navigation and to which Contracting States will conform in accordance with the Convention; in the event of impossibility of compliance, notification to the Council is compulsory under Article 38.

Recommended Practice: Any specification for physical characteristics, configuration, matériel, performance, personnel or procedure, the uniform application of which is recognized as desirable in the interest of safety, regularity or efficiency of international air navigation, and to which Contracting States will endeavour to conform in accordance with the Convention.

- b) *Appendices* comprising material grouped separately for convenience but forming part of the Standards and Recommended Practices adopted by the Council.
- c) *Definitions* of terms used in the Standards and Recommended Practices which are not self-explanatory in that they do not have accepted

dictionary meanings. A definition does not have independent status but is an essential part of each Standard and Recommended Practice in which the term is used, since a change in the meaning of the term would affect the specification.

- d) *Tables* and *Figures* which add to or illustrate a Standard or Recommended Practice and which are referred to therein, form part of the associated Standard or Recommended Practice and have the same status.

2.—*Material approved by the Council for publication in association with the Standards and Recommended Practices:*

- a) *Forewords* comprising historical and explanatory material based on the action of the Council and including an explanation of the obligations of States with regard to the application of the Standards and Recommended Practices ensuing from the Convention and the Resolution of Adoption;
- b) *Introductions* comprising explanatory material introduced at the beginning of parts, chapters or sections of the Annex to assist in the understanding of the application of the text;
- c) *Notes* included in the text, where appropriate, to give factual information or references bearing on the Standards or Recommended Practices in question, but not constituting part of the Standards or Recommended Practices;
- d) *Attachments* comprising material supplementary to the Standards and Recommended Practices, or included as a guide to their application.

Selection of language

This Annex has been adopted in four languages — English, French, Russian and Spanish. Each Contracting State is requested to select one of those texts for the purpose of national implementation and for other effects provided for in the Convention, either through direct use or through translation into its own national language, and to notify the Organization accordingly.

Editorial practices

The following practice has been adhered to in order to indicate at a glance the status of each statement: *Standards*

have been printed in light face roman; *Recommended Practices* have been printed in light face italics, the status being indicated by the prefix **Recommendation**; *Notes* have been printed in light face italics, the status being indicated by the prefix *Note*.

The following editorial practice has been followed in the writing of specifications: for Standards the operative verb “shall” is used, and for Recommended Practices the operative verb “should” is used.

Any reference to a portion of this document, which is identified by a number, includes all subdivisions of the portion.

Applicability

The Standards and Recommended Practices in this document govern the application of the *Regional Supplementary Procedures* (Doc 7030, Part 3 — Meteorology), in which document will be found statements of regional choices, where such options are permitted by this Annex.

Responsibility

In accordance with a similar provision in the Foreword to Annex 6, Part II, the responsibility which devolves upon an operator, in accordance with the provisions of Annex 3, falls upon the pilot-in-command in the case of international general aviation.

Relation to corresponding WMO publications

The regulatory material contained in Annex 3 is, except for a few minor editorial differences, identical with that appearing in the Technical Regulations (Chapter C.3.1) of the World Meteorological Organization (WMO).

The aeronautical meteorological code forms referred to in Annex 3 are developed by the World Meteorological Organization on the basis of aeronautical requirements contained in this Annex, or stated from time to time by the Council. The aeronautical meteorological code forms are promulgated by WMO in its Publication No. 306 — *Manual on Codes*, Volume I.

Table A. Amendments to Annex 3

<i>Amendment(s)</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Adopted/approved Effective Applicable</i>
1st Edition	Second Session of the Meteorology Division	Meteorological codes for the transmission of meteorological information for aeronautical purposes.	16 April 1948 15 September 1948 1 January 1949
1 to 21	Special Session of the Meteorology Division	Updating and improvement of meteorological codes.	17 September 1948 23 December 1948 1 January 1949
22 to 37	Third Session of the Meteorology Division	Use of plain language and a simplified code for flight conditions in air-reports.	28 May 1951 1 October 1951 1 January 1952
38	First Air Navigation Conference	Introduction of the radiotelephony or radiotelegraphy AIREP form of air-report.	15 December 1953 1 August 1954 1 September 1954
39	First Air Navigation Conference	Revised radiotelegraphy form of POMAR Code for air-reports.	18 May 1954 20 August 1954 1 September 1954
40	World Meteorological Organization	New aeronautical meteorological figure codes in an Attachment, replacing those (except the POMAR code) hitherto appearing in the SARPs.	28 September 1954 1 January 1955 1 January 1955
41	Fourth Session of the Meteorology Division	Introduction of Standards and Recommended Practices governing the obligations of Contracting States relating to the establishment of meteorological organization in each State, adequate to satisfy Articles 28 and 37 of the Convention; consequential change of title of Annex 3 to read <i>International Standards and Recommended Practices — Meteorology</i> .	1 April 1955 1 August 1955 1 January 1956
42	Second Air Navigation Conference	Simplification of the detailed specifications for the method of determining the position in the AIREP and POMAR forms of air-report.	8 May 1956 1 September 1956 1 December 1956
43	Third Air Navigation Conference	Introduction of the term “SIGMET information” to replace the terms “advisory message” and “warning message”; amendment of the table for “State of Sea” in the POMAR code.	13 June 1957 1 October 1957 1 December 1957
44	Rules of the Air and Air Traffic Services/ Search and Rescue Divisions	Changes in the list of elements in Section 1 (Position report) of the AIREP form of air-report — deletion of the element “Flight conditions” and amendment of the last element in the Section to read “Next position and time over”.	18 February 1960 1 May 1960 1 August 1960
45	Rules of the Air and Air Traffic Services/ Search and Rescue Divisions	Amendment of model AIREP and POMAR forms of air-report consequential to Amendment 44.	18 February 1960 — 1 August 1960
46	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1960.	8 June 1960 — 8 June 1960
47	Fifth Session of the Meteorology Division	Amendment to the procedures for aircraft meteorological observations and reports, modifying those for special observations and introducing requirements for additional observations; deletion of the POMAR form of air-report; elimination of flight meteorological watch and the introduction of en-route forecast service to supplement area meteorological watch; amendment to the provisions concerning meteorological conditions along the route to an alternate aerodrome.	2 December 1960 1 April 1961 1 July 1961

<i>Amendment(s)</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Adopted/approved Effective Applicable</i>
48	Fifth Session of the Meteorology Division	Amendment to model AIREP form of air-report to reflect changes in procedures for aircraft meteorological observations and reports, consequential to an amendment to the PANS-RAC.	2 December 1960 — 1 July 1961
49	Fifth Session of the Meteorology Division	Introduction of definition of “D-value”.	8 April 1963 1 August 1963 1 November 1963
50	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1964.	18 March 1964 — 18 March 1964
51	Meteorology and Operations Divisional Meeting	Introduction of a requirement for observations to be made at locations where they will be representative of the area for which they are primarily required; extension of the criteria for special air-reports to cover phenomena likely to affect efficiency as well as safety, and deleting the requirement for “additional aircraft observations” according to regionally agreed criteria; deletion from the AIREP form of air-report of D-value, weather and cloud as standard items; introduction of a modified model AIREP form; changes to the provisions relating to forms of meteorological messages and providing for the exchange of information in pictorial form; introduction of definition of “plain language”.	31 May 1965 1 October 1965 10 March 1966
52	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 10 March 1966.	12 December 1966 — 12 December 1966
53	Meteorology and Operations Divisional Meeting	Permitting regional air navigation agreement on the use of a pictorial form of message for the dissemination of forecasts; replacement of the term “symbolic form of message” by a more specific description of the form of message to which this expression was intended to refer.	12 December 1966 12 April 1967 24 August 1967
54	World Meteorological Organization	Updating of aeronautical meteorological figure codes, introduced by WMO, as of 1 January 1968.	13 June 1967 — 1 January 1968
55	France	Permitting changes to be made to air-reports before their ground-to-ground dissemination.	16 December 1968 16 April 1969 18 September 1969
56	Sixth Air Navigation Conference	Introduction of: specifications for area forecast centres; simplified specifications for meteorological offices to reflect increasing centralization; extended coverage of aircraft reports to include adverse weather conditions encountered during initial climb and final approach; routine reporting by aircraft of “spot” rather than “mean” winds; improved criteria for in-flight reports of the intensity of turbulence; new definition of “air traffic services reporting office” and changes in the definition of “air traffic services unit”; changes to the aeronautical meteorological codes introduced by WMO, as of 18 September 1969.	15 May 1970 15 September 1970 4 February 1971
57	Second Meeting of the Technical Panel on Supersonic Transport Operations	Amendment to the definition of “SIGMET information” to take account of the requirements of SST aircraft operations; introduction of provisions for making and recording special observations whenever moderate turbulence, hail or cumulonimbus clouds are encountered during transonic or supersonic flight.	19 March 1971 6 September 1971 6 January 1972
58	World Meteorological Organization	Updating of aeronautical meteorological codes, introduced by WMO, as of 1 January 1972.	19 March 1971 — 6 January 1972

<i>Amendment(s)</i>	<i>Source(s)</i>	<i>Subject(s)</i>	<i>Adopted/approved Effective Applicable</i>
59	Sixth Air Navigation Conference	Permitting the omission of information on “next position and time over” from Section 1 of air-reports exchanged between meteorological offices; introduction of changes to the formats and data conventions in the model form of air-report to make it suitable for direct input into computers.	24 March 1972 24 July 1972 7 December 1972
60	Sixth Air Navigation Conference. Eighth Air Navigation Conference. Meteorology Divisional Meeting (1974)	Complete revision of Annex 3, incorporating the PANS-MET, the specifications of which were regarded as being suitable for inclusion in Annex 3 as Standards and Recommended Practices; the revision took into account recently approved operational requirements and up-to-date methods of meeting them; introduction of new Standards and Recommended Practices, relating to service for operators and flight crew members, meteorological information for air traffic services and for search and rescue services, together with requirements for communications and their use; the title of Annex 3 was, accordingly, amended to read <i>Meteorological Service for International Air Navigation</i> .	26 November 1975 26 March 1976 12 August 1976
61	Ninth Air Navigation Conference. Meteorology Divisional Meeting (1974)	New provisions and revision of existing provisions to improve the co-ordination between meteorological offices/stations and air traffic services units and the supply of meteorological information to the latter; new specifications for observations and reports for take-off and landing; introduction of a note referring to the specifications of Annex 14 for the siting and construction of equipment and installations on operational areas to reduce the hazard to aircraft to a minimum; replacement of the expression “supersonic transport aircraft” by the expression “supersonic aircraft”; updating of Part 2, Appendix 2; revision of definition of “nephelanalysis” and deletion of “(29.92 in.)” from definition of “flight level”; deletion of Attachment D — Aeronautical Meteorological Codes.	14 December 1977 14 April 1978 10 August 1978
62	Eighth Air Navigation Conference and ICAO Council	Inclusion in Appendix 1 of model charts and forms developed by WMO on the basis of the operational requirements contained in Annex 3; transfer of the data designators and geographical designators from Appendix 2 to Annex 3 to the <i>Manual of Aeronautical Meteorological Practice</i> (Doc 8896-AN/893/2).	26 June 1978 26 October 1978 29 November 1979
63	MET Divisional Meeting (1974). ICAO Secretariat. Operational Flight Information Service Panel. Ninth Air Navigation Conference. Doc 9328-AN/908	Definition for “meteorological bulletin”; correction to shortcomings in ground-to-ground dissemination of air-reports; decrease in SIGMET messages dealing with “active thunderstorm area”; deletion of reference to “reporting lines”; reference to new <i>Manual of Runway Visual Range Observing and Reporting Practices</i> .	23 March 1981 23 July 1981 26 November 1981
64	ICAO Secretariat	New provisions and revision of existing provisions to meet operational requirements for observing and reporting of low-level wind shear, including the introduction of wind shear warnings for the climb-out and approach phases of flight.	6 December 1982 6 April 1983 24 November 1983
65	Communications/Meteorology Divisional Meeting (1982). Third Meeting of the ADAPT Panel	New provisions and revision of existing provisions related to the introduction of the new world area forecast system; methods of exchange of operational meteorological data; improvement of accuracy of runway visual range assessment, and reporting.	10 June 1983 10 October 1983 22 November 1984

INTERNATIONAL STANDARDS AND RECOMMENDED PRACTICES

CHAPTER 1. DEFINITIONS

1.1 Definitions

1.1.1 When the following terms are used in the Standards and Recommended Practices for Meteorological Service for International Air Navigation, they have the following meanings:

Aerodrome. A defined area on land or water (including any buildings, installations and equipment) intended to be used either wholly or in part for the arrival, departure and surface movement of aircraft.

Aerodrome climatological summary. Concise summary of specified meteorological elements at an aerodrome, based on statistical data.

Aerodrome climatological table. Table providing statistical data on the observed occurrence of one or more meteorological elements at an aerodrome.

Aerodrome control tower. A unit established to provide air traffic control service to aerodrome traffic.

Aerodrome elevation. The elevation of the highest point of the landing area.

Aerodrome meteorological office. An office, located at an aerodrome, designated to provide meteorological service for international air navigation.

Aeronautical descriptive climatological memorandum. Description of the main climatic features of concern to aviation for an area or an air route.

Aeronautical fixed service (AFS). A telecommunication service between specified fixed points provided primarily for the safety of air navigation and for the regular, efficient and economical operation of air services.

Aeronautical fixed telecommunication network (AFTN). An integrated world-wide system of aeronautical fixed circuits provided, as part of the Aeronautical Fixed Service, for the exchange of messages between the aeronautical fixed stations within the network.

Note.— “Integrated” is to be interpreted as a mode of operation necessary to ensure that messages can be transmitted from any aeronautical fixed station within the network to any other aeronautical fixed station within the network.

Aeronautical meteorological station. A station designated to make observations and meteorological reports for use in international air navigation.

Aeronautical mobile service. A radiocommunication service between aircraft stations and aeronautical stations, or between aircraft stations.

Aeronautical telecommunication station. A station in the aeronautical telecommunication service.

Aircraft. Any machine that can derive support in the atmosphere from the reactions of the air other than the reactions of the air against the earth’s surface.

Aircraft observation. The evaluation of one or more meteorological elements made from an aircraft in flight.

Air-report. A report from an aircraft in flight prepared in conformity with requirements for position, and operational and/or meteorological reporting.

Air traffic services unit. A generic term meaning variously air traffic control unit, flight information centre or air traffic services reporting office.

Alternate aerodrome. An aerodrome specified in the flight plan to which a flight may proceed when it becomes inadvisable to land at the aerodrome of intended landing.

Note.— An alternate aerodrome may be the aerodrome of departure.

Altitude. The vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

Approach control office. A unit established to provide air traffic control service to controlled flights arriving at, or departing from, one or more aerodromes.

Appropriate ATS Authority. The relevant authority designated by the State responsible for providing air traffic services in the airspace concerned.

Area control centre. A unit established to provide air traffic control service to controlled flights in control areas under its jurisdiction.

Area of coverage (world area forecast system). A geographical area for which a regional area forecast centre supplies forecasts for flights departing from aerodromes in its service area.

Area of responsibility (world area forecast system). A geographical area for which a regional area forecast centre prepares significant weather forecasts.

Briefing. Oral commentary on existing and/or expected meteorological conditions.

Collecting centre. A meteorological office designated to collect air-reports.

Consultation. Discussion with a meteorologist or another qualified person of existing and/or expected meteorological conditions relating to flight operations; a discussion includes answers to questions.

Control area. A controlled airspace extending upwards from a specified limit above the earth.

Cruising level. A level maintained during a significant portion of a flight.

Elevation. The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.

Flight crew member. A licensed crew member charged with duties essential to the operation of an aircraft during flight time.

Flight documentation. Written or printed documents, including charts or forms, containing meteorological information for a flight.

Flight information centre. A unit established to provide flight information service and alerting service.

Flight information region. An airspace of defined dimensions within which flight information service and alerting service are provided.

Flight level. A surface of constant atmospheric pressure which is related to a specific pressure datum, 1 013.2 mb, and is separated from other such surfaces by specific pressure intervals.

Forecast. A statement of expected meteorological conditions for a specified time or period, and for a specified area or portion of airspace.

Grid point data in digital form. Computer processed meteorological data for a set of regularly spaced points on a chart, for transmission from a meteorological computer to another computer in a code form suitable for automated use.

Note.— In most cases such data are transmitted on medium or high speed telecommunications channels.

Grid point data in numerical form. Processed meteorological data for a set of regularly spaced points on a chart, in a code form suitable for manual use.

Note.— In most cases such data are transmitted on low speed telecommunications channels.

Height.

1) The vertical distance of a level, a point or an object considered as a point, measured from a specified datum.

Note.— The datum may be specified either in the text or in an explanatory note in the publication concerned.

2) The vertical dimension of an object.

Note.— The term height may also be used in a figurative sense for a dimension other than vertical, e.g. the height of a letter or a figure painted on a runway.

Meteorological Authority. The authority providing or arranging for the provision of meteorological service for international air navigation on behalf of a Contracting State.

Meteorological bulletin. A text comprising meteorological information preceded by an appropriate heading.

Meteorological information. Meteorological report, analysis, forecast, and any other statement relating to existing or expected meteorological conditions.

Meteorological office. An office designated to provide meteorological service for international air navigation.

Meteorological report. A statement of observed meteorological conditions related to a specified time and location.

Meteorological satellite. An artificial Earth satellite making meteorological observations and transmitting these observations to Earth.

Nephanalysis. The graphical depiction of analysed cloud data on a geographical map.

Observation (meteorological). The evaluation of one or more meteorological elements.

Operational flight plan. The operator's plan for the safe conduct of the flight based on considerations of aeroplane performance, other operating limitations and relevant expected conditions on the route to be followed and at the aerodromes concerned.

Operational planning. The planning of flight operations by an operator.

Operator. A person, organization or enterprise engaged in or offering to engage in an aircraft operation.

Pilot-in-command. The pilot responsible for the operation and safety of the aircraft during flight time.

Prognostic chart. A forecast of a specified meteorological element(s) for a specified time or period and a specified surface or portion of airspace, depicted graphically on a chart.

Regional air navigation agreement. Agreement approved by the Council of ICAO normally on the advice of a Regional Air Navigation Meeting.

Regional area forecast centre (RAFC). A meteorological centre designated to prepare and supply area forecasts for flights departing from aerodromes within its service area and to supply grid point data in digital form for up to world-wide coverage.

Regional collecting centre. Collecting centre designated to collect air-reports on a regional basis.

Reporting point. A specified geographical location in relation to which the position of an aircraft can be reported.

Rescue co-ordination centre. A unit responsible for promoting efficient organization of search and rescue service and for co-ordinating the conduct of search and rescue operations within a search and rescue region.

Runway. A defined rectangular area, on a land aerodrome, prepared for the landing and take-off of aircraft.

Runway visual range. The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.

Search and rescue service unit. A generic term meaning, as the case may be, rescue co-ordination centre, rescue subcentre or alerting post.

Service area (world area forecast system). A geographical area within which a regional area forecast centre is responsible for supplying area forecasts to meteorological authorities and other users.

Standard isobaric surface. An isobaric surface used on a world-wide basis for representing and analysing the conditions in the atmosphere.

Threshold. The beginning of that portion of the runway usable for landing.

Touchdown zone. The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.

Upper-air chart. A meteorological chart relating to a specified upper-air surface or layer of the atmosphere.

VOLMET broadcast. Routine broadcast of meteorological information for aircraft in flight.

World area forecast centre (W AFC). A meteorological centre designated to prepare and supply upper-air forecasts in digital form on a global basis to regional area forecast centres.

World area forecast system (WAFS). A world-wide system by which world and regional area forecast centres provide aeronautical meteorological en-route forecasts in uniform standardized formats.

1.2 Terms used with a limited meaning

1.2.1 For the purpose of this Annex, the following terms are used with a limited meaning as indicated below:

- a) to avoid confusion in respect of the term "service" between the Meteorological Service considered as an administrative entity and the service which is provided, "Meteorological Authority" is used for the former and "service" for the latter;
- b) "provide" is used solely in connexion with the provision of service;
- c) "issue" is used solely in connexion with cases where the obligation specifically extends to sending out the information to a user;
- d) "make available" is used solely in connexion with cases where the obligation ends with making the information accessible to a user;
- e) "supply" is used solely in connexion with cases where either c) or d) applies.

CHAPTER 2. GENERAL PROVISIONS

Introductory Note 1.— It is recognized that the provisions of this Annex with respect to meteorological information are subject to the understanding that the obligation of a Contracting State is for the supply, under Article 28 of the Convention, of meteorological information and that the responsibility for the use made of such information is that of the user.

Introductory Note 2.— Although the Convention on International Civil Aviation allocates to the State of Registry certain functions which that State is entitled to discharge, or obliged to discharge, as the case may be, the Assembly recognized, in Resolution A18-16, that the State of Registry may be unable to fulfill its responsibilities adequately in instances where aircraft are leased, chartered or interchanged — in particular without crew — by an operator of another State and that the Convention may not adequately specify the rights and obligations of the State of an operator in such instances. Accordingly, the Council, without prejudice to the question of whether the Convention may require amendment with respect to the allocation of functions to States, urged that if, in the above-mentioned instances, the State of Registry finds itself unable to discharge adequately the functions allocated to it by the Convention, it delegate to the State of the operator, subject to acceptance by the latter State, those functions of the State of Registry that can more adequately be discharged by the State of the operator. It is understood that the foregoing action will only be a matter of practical convenience and will not affect either the provisions of the Chicago Convention prescribing the duties of the State of Registry or any third State.

2.1 Objective, determination and provision of meteorological service

2.1.1 The objective of meteorological service for international air navigation shall be to contribute towards the safety, regularity and efficiency of international air navigation.

2.1.2 This objective shall be achieved by supplying operators, flight crew members, air traffic services units, search and rescue services units, airport managements and others concerned with the conduct or development of international air navigation with the meteorological information necessary for the performance of their respective functions.

2.1.3 Each Contracting State shall determine the meteorological service which it will provide to meet the needs of international air navigation. This determination shall be made in accordance with the provisions of this Annex and with due regard to regional air navigation agreements; it shall

include the determination of the meteorological service to be provided for international air navigation over international waters and other areas which lie outside the territory of the State concerned.

2.1.4 Each Contracting State shall designate the authority, hereinafter referred to as the Meteorological Authority, to provide or to arrange for the provision of meteorological service for international air navigation on its behalf.

2.2 Supply and use of meteorological information

2.2.1 Close liaison shall be maintained between those concerned with the supply and those concerned with the use of meteorological information on matters which affect the provision of meteorological service.

2.2.2 The meteorological information supplied to aeronautical personnel shall be up to date and shall be in forms which require a minimum of interpretation by users, as specified in the following chapters.

2.3 Notifications required from operators

2.3.1 An operator requiring meteorological service or changes in existing meteorological service shall notify, sufficiently in advance, the Meteorological Authority or the meteorological office(s) concerned. The minimum amount of advance notice required shall be as agreed between the Meteorological Authority or meteorological office(s) and the operator.

2.3.2 The Meteorological Authority shall be notified by the operator requiring service when:

- a) new routes or new types of operations are planned;
- b) changes of a lasting character are to be made in scheduled operations;
- c) other changes, affecting the provision of meteorological service, are planned.

Such information shall contain all details necessary for the planning of appropriate arrangements by the Meteorological Authority.

2.3.3 The aerodrome meteorological office, or the meteorological office concerned, shall be notified by the operator or a flight crew member:

- a) of flight schedules;
- b) when non-scheduled flights are to be operated;
- c) when flights are delayed, advanced or cancelled.

2.3.4 Recommendation.— *The notification to the aerodrome meteorological office, or the meteorological office concerned, of individual flights should contain the following information except that, in the case of scheduled flights, the requirement for some or all of this information may be waived by agreement between the meteorological office and the operator:*

- a) aerodrome of departure and estimated time of departure;*
- b) destination and estimated time of arrival;*
- c) route to be flown and estimated times of arrival at, and departure from, any intermediate aerodrome(s);*

- d) alternate aerodromes needed to complete the operational flight plan and taken from the relevant list contained in the Regional Air Navigation Plan;*
 - e) cruising level;*
 - f) for supersonic flights, the alternative subsonic cruising level and the locations of the transonic acceleration and deceleration areas and of the subsonic climb and descent paths;*
 - g) type of flight, whether under the visual or the instrument flight rules;*
 - h) type of meteorological information requested for a flight crew member, whether flight documentation and/or briefing or consultation;*
 - i) time(s) at which briefing, consultation and/or flight documentation are required.*
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CHAPTER 3. WORLD AREA FORECAST SYSTEM AND METEOROLOGICAL OFFICES

3.1 Objectives and components of the world area forecast system

3.1.1 The objectives of the world area forecast system shall be:

- a) to supply meteorological offices with forecasts of en-route meteorological conditions concerning upper winds, upper-air temperatures, tropopause and significant weather in pictorial and/or alphanumeric form suitable, as far as practicable, for direct use by operators, flight crew members, air traffic services units and other aeronautical users;
- b) to supply meteorological authorities and other users with upper wind, upper-air temperature and tropopause height forecasts for grid points in digital form.

These objectives shall be achieved through a comprehensive, integrated, world-wide and, as far as practicable, uniform system, and in a cost-effective manner.

Note.— *Guidance on principles for the world area forecast system is contained in ICAO Doc 8896, Manual of Aeronautical Meteorological Practice, and in the WMO Guide on Meteorological Office Practices.*

3.2 World area forecast centres

3.2.1 A Contracting State, having accepted the responsibility for providing a world area forecast centre (WAFC) within the framework of the world area forecast system, shall arrange for that centre:

- a) to prepare global forecasts for grid points in digital form for all required levels and in a standard format; the forecasts shall comprise upper winds, upper-air temperatures, tropopause heights and maximum wind speed, direction and height;
- b) to issue the forecasts for grid points to regional area forecast centres (RAFCs) as required; and
- c) to prepare and issue amendments to the forecasts for grid points as necessary in accordance with the criteria specified in 3.2.6.

Note.— *Guidance on the procedures to be followed by a WAFC is contained in Attachment A.*

3.2.2 **Recommendation.**— *In case of interruption of the operation of a WAFC, its functions should be carried out by the other WAFC.*

3.2.3 **Recommendation.**— *The forecasts prepared twice daily by a WAFC should be valid for 12, 18, 24 and 30 hours after the time (0000 and 1200 GMT) of the synoptic data on which the forecasts were based and should be available for start of transmission as soon as technically feasible but not later than 6 hours after standard time of observation.*

3.2.4 **Recommendation.**— *The grid point forecasts prepared by a WAFC should comprise:*

- a) *wind and temperature data for flight levels 50 (850 mb), 100 (700 mb), 180 (500 mb), 240 (400 mb), 300 (300 mb), 340 (250 mb), 390 (200 mb) and 450 (150 mb);*
- b) *tropopause height, and direction, speed and height of maximum wind; and*
- c) *wind and temperature data for flight levels 530 (100 mb) and 600 (70 mb) when and where required.*

3.2.5 WAFCs shall adopt uniform formats and codes for the supply of forecasts and amendments.

3.2.6 **Recommendation.**— *Amendments to upper wind and upper-air temperature forecasts should be issued in accordance with the following criteria:*

Upper wind

Change in direction of 30° or more, provided the wind speed is 30 kt or more before or after the change; change in speed of 20 kt or more.

Upper-air temperatures

Change of more than 5°C.

3.2.7 **Recommendation.**— *Amendments to the upper wind and upper-air temperature forecasts should be prepared in the form of amended meteorological bulletins and abbreviated plain-language messages and should be issued to RAFCs with the minimum possible delay.*

Note.— *Guidance on the use of abbreviated plain language is given in Attachment B.*

3.3 Regional area forecast centres

3.3.1 A Contracting State, having accepted the responsibility for providing a regional area forecast centre (RAFC) within the framework of the area forecast system, shall arrange for that centre:

- a) to receive global digital grid point data from a WAFC, so as to meet the needs of meteorological authorities and other users within its service area, including those needs related to centralized flight planning;
- b) to store the digital grid point data received from a WAFC, and to process and supply selectively these data to meteorological authorities and other users in its service area, in an agreed format;
- c) to prepare upper wind and temperature charts on the basis of the data received, and to supply the relevant charts and abbreviated plain-language amendments thereto to users as agreed between the RAFC and the users within its service area;

Note.— The upper wind and temperature charts will be produced from grid point data received from a WAFC, except on those occasions when the RAFC considers it essential to adjust the chart(s) on the basis of recent basic data received.

- d) to notify the relevant WAFC immediately of the content of and reasons for any amendments it has issued to the forecast received from the WAFC;
- e) to prepare significant weather charts and, as required, significant weather forecast messages in abbreviated plain language, for its area of responsibility;

Note.— In order to prepare these charts and amendments thereto the RAFC will need to receive basic synoptic and asynoptic data, including satellite data (polar-orbiting and geostationary) and aircraft meteorological reports.

- f) to supply the significant weather charts, significant weather forecast messages in abbreviated plain language, and plain-language amendments thereto in the same manner as in c) above;
- g) to exchange the significant weather charts and abbreviated plain-language amendments thereto with other RAFCs as necessary, so as to enable each centre to provide significant weather charts for its area of coverage;
- h) to prepare WITEM messages and issue them to users as required.

Note 1.— Guidance on the procedures to be followed by a regional area forecast centre is contained in Attachment A.

Note 2.— Specifications for the preparation of significant weather and upper-air prognostic charts are contained in the Appendix.

Note 3.— Guidance on the preparation of abbreviated plain-language significant weather forecast messages is contained in Attachment B.

Note 4.— The WITEM code is contained in WMO Publication No. 306, Manual on Codes, Volume I.

3.3.2 Recommendation.— *The lists of States/territories served by the RAFCs in each service area, as shown in the air navigation plans, should be adjusted as necessary in accordance with regional air navigation agreement.*

3.3.3 Recommendation.— *The areas of responsibility for the preparation of significant weather forecasts should be as agreed by the RAFCs responsible for providing area forecasts for flight operations conducted over the area of coverage, and subject to subsequent regional air navigation agreement.*

Note.— The areas of responsibility are contained in the relevant Regional Air Navigation Plan.

3.3.4 Recommendation.— *The areas of coverage of the forecasts in chart and/or alphanumeric form supplied to the users should be determined by agreement between the relevant RAFC and the users.*

Note.— Maximum areas of coverage suitable for use in flight documentation are contained in the relevant Regional Air Navigation Plan.

3.3.5 Recommendation.— *RAFC products should be issued four times a day for fixed valid times of 0000, 0600, 1200 and 1800 GMT. The transmission of each forecast should be completed nine hours before its valid time.*

3.3.6 Recommendation.— *The digital data should be transmitted to meteorological authorities and other users with minimum delay after receipt from the WAFC.*

3.3.7 Recommendation.— *The significant weather charts should cover the following layers:*

- a) *the layer between flight levels 250 and 450 (400 and 150 mb);*
- b) *the layer between flight levels 100 and 250 (700 and 400 mb) for limited geographical areas, as determined by regional air navigation agreement;*
- c) *the layer between flight levels 450 and 600 (150 and 70 mb) if so determined by regional air navigation agreement. When so determined, forecasts covering the layer between flight levels 450 and 600 should be combined with those covering the layer between flight levels 250 and 450.*

3.3.8 Recommendation.— *The upper wind and upper-air temperature charts should cover:*

- a) flight level 340 (250 mb);*
- b) other levels as determined by regional air navigation agreement.*

3.3.9 Recommendation.— *Amendments to significant weather forecasts should be supplied in the form of abbreviated plain-language messages.*

Note.— *Guidance on the preparation of abbreviated plain-language significant weather forecast messages is contained in Attachment B.*

3.3.10 Recommendation.— *RAFCs should apply the following criteria for the amendment of significant en-route weather forecasts:*

Aircraft icing and turbulence

Newly expected occurrence; error in expected position of phenomena; intensity increasing; intensity decreasing from severe to light or nil, or from moderate to nil.

Other significant en-route weather phenomena

Newly expected occurrence; no longer expected.

3.3.11 Recommendation.— *RAFCs should supply to meteorological authorities and other users within their service areas amendments to upper wind and upper-air temperature forecasts received from a WAFC.*

3.4 Meteorological offices

3.4.1 Each Contracting State shall establish one or more aerodrome and/or other meteorological offices which shall be adequate for the provision of the meteorological service required to satisfy operational needs.

3.4.2 An aerodrome meteorological office shall carry out all or some of the following functions as necessary to meet the needs of flight operations at the aerodrome:

- a) prepare and/or obtain forecasts and other relevant information for flights with which it is concerned; the extent of its responsibilities to prepare forecasts shall be related to the local availability and use of en-route and aerodrome forecast material received from other offices;
- b) prepare and/or obtain forecasts of local meteorological conditions;

- c) maintain a continuous survey of meteorological conditions over the aerodromes for which it is designated to prepare forecasts;

- d) provide briefing, consultation and flight documentation to flight crew members and/or other flight operations personnel;

- e) supply other meteorological information to aeronautical users;

- f) display the available meteorological information;

- g) exchange meteorological information with other meteorological offices.

3.4.3 Recommendation.— *The aerodrome meteorological offices at which briefing, consultation and/or flight documentation are required, as well as the areas and/or air routes to be covered, should be determined by regional air navigation agreement and, as necessary, by supplementary agreement between the Meteorological Authority and the operator concerned.*

3.4.4 Recommendation.— *The aerodromes for which landing forecasts are required should be determined by regional air navigation agreement.*

3.4.5 The extent to which an aerodrome meteorological office prepares forecasts and/or makes use of assistance from RAFCs and other sources shall be determined by the Meteorological Authority concerned.

3.4.6 Recommendation.— *Aerodrome meteorological offices should use as far as practicable output products of the world area forecast system in the preparation of flight documentation.*

3.4.7 For aerodromes without meteorological offices:

- a) the Meteorological Authority concerned shall designate one or more meteorological offices to supply meteorological information as required;
- b) the competent authorities shall establish means by which such information can be supplied to the aerodromes concerned.

3.5 Meteorological watch offices

3.5.1 A Contracting State, having accepted the responsibility for providing air traffic services within a flight information region or a control area, shall establish one or more meteorological watch offices, or arrange for another Contracting State to do so.

3.5.2 A meteorological watch office shall:

- a) maintain watch over meteorological conditions affecting flight operations within its area of responsibility;
- b) prepare SIGMET and other information relating to its area of responsibility;
- c) supply SIGMET information and, as required, other meteorological information to associated air traffic services units;
- d) disseminate SIGMET information.

3.5.3 The extent to which a meteorological watch office makes use of assistance from RAFCs and other sources shall be determined by the Meteorological Authority concerned.

3.5.4 Recommendation.— *The boundaries of the area over which meteorological watch is to be maintained by a meteorological watch office should, in so far as is practicable, be coincident with the boundaries of a flight information region or a control area or a combination of flight information regions and/or control areas.*

3.5.5 Recommendation.— *Meteorological watch should be maintained continuously; however, in areas with a low density of traffic the watch may be restricted to the period relevant to expected flight operations.*

CHAPTER 4. METEOROLOGICAL OBSERVATIONS AND REPORTS

4.1 Aeronautical meteorological stations and observations

4.1.1 Each Contracting State shall establish at aerodromes and other points of significance to international air navigation, in its territory, such aeronautical meteorological stations as it determines to be necessary. An aeronautical meteorological station may be a separate station or may be combined with a synoptic station.

4.1.2 Aeronautical meteorological stations shall make routine observations at fixed intervals. At aerodromes, the routine observations shall be supplemented by special observations whenever specified changes occur in respect of surface wind, visibility, runway visual range, present weather and/or cloud. Other non-routine observations, such as observations for take-off and landing, shall be made as agreed between the Meteorological Authority and the appropriate ATS Authority.

4.1.3 **Recommendation.**— *The meteorological instruments used at an aerodrome should be situated in such a way as to supply data which are representative of the area for which the measurements are required.*

Note.— *Specifications concerning the siting and construction of equipment and installations on operational areas, aimed at reducing the hazard to aircraft to a minimum, are contained in Annex 14, Chapter 8.*

4.1.4 **Recommendation.**— *Meteorological instruments at aeronautical meteorological stations should be exposed, operated and maintained in accordance with the practices, procedures and specifications promulgated by the World Meteorological Organization.*

4.1.5 **Recommendation.**— *The observers at an aerodrome should be located, in so far as is practicable, so as to supply data which are representative of the area for which the observations are required.*

4.1.6 **Recommendation.**— *Each Contracting State should arrange for its aeronautical meteorological stations to be inspected at sufficiently frequent intervals to ensure that a high standard of observations is maintained, that instruments and all their indicators are functioning correctly, and to check whether the exposure of the instruments has changed significantly.*

4.1.7 **Recommendation.**— *At aerodromes, suitable observation systems should be installed to complement the aids for final approach and landing. Where precision*

approaches and, in particular, where Operational Performance Category II, III A and III B operations are planned, those observation systems should include automated equipment for measuring or evaluating, as appropriate, and for monitoring and remote indicating of surface wind, runway visual range, cloud height, and where the state of technology permits, of other meteorological parameters affecting landing and take-off operations. At certain aerodromes, where high levels of traffic make this necessary, these devices should be integrated automatic systems for acquisition, processing, dissemination/display in real time of the meteorological parameters affecting landing and take-off operations.

Note.— *Operational performance categories are described in Annex 10, Volume I, Attachment C to Part I.*

4.1.8 **Recommendation.**— *When an integrated automatic system is used for the dissemination/display of meteorological information, it should be capable of accepting the manual insertion of data covering those meteorological elements which cannot be observed by automatic means.*

4.1.9 The observations shall form the basis for the preparation of reports to be disseminated at the aerodrome of origin and for reports to be disseminated beyond the aerodrome of origin.

4.1.10 Owing to the variability of meteorological elements in space and time, to limitations of observing techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a report shall be understood by the recipient to be the best approximation to the actual conditions at the time of observation.

Note.— *Guidance on the operationally desirable and currently attainable accuracy of measurement or observation is given in Attachment C.*

4.2 Routine observations and reports

4.2.1 At aerodromes, routine observations shall be made throughout the 24 hours each day, except as otherwise agreed between the Meteorological Authority, the appropriate ATS Authority and the operator concerned. Such observations shall be made at intervals of one hour or, if so determined by regional air navigation agreement, at intervals of one half-hour. At other aeronautical meteorological stations, such observations shall be made as determined by the Meteorological Authority taking into account the requirements of air traffic services units and aircraft operations.

4.2.2 Reports of routine observations shall be issued as routine reports to local air traffic services units as required and shall be made available to the operators and to other users at the aerodrome.

4.2.3 Recommendation.— *Routine reports should be disseminated beyond the aerodrome of origin in accordance with regional air navigation agreement.*

4.3 Special observations, special reports and selected special reports

4.3.1 A list of criteria for special observations shall be established by the Meteorological Authority, in consultation with the appropriate ATS Authority, operators and others concerned. The list shall include those values which:

- a) most closely correspond with the operating minima of the operators using the aerodrome;
- b) satisfy other local requirements of the air traffic services units and of the operators;
- c) constitute criteria for selected special reports.

Note.— *A selected special report is a report prepared in accordance with criteria listed in 4.3.3 and intended primarily for dissemination beyond the aerodrome of origin.*

4.3.2 Reports of special observations shall be prepared for use at the aerodrome of origin; they shall be issued as special reports to local air traffic services units as soon as the specified conditions occur. However, by agreement between the Meteorological Authority and the appropriate ATS Authority, they need not be issued in respect of:

- a) any element for which there is in the local air traffic services unit an indicator corresponding to the one in the meteorological station, and where arrangements are in force for the use of this indicator to make observations to meet the needs for reports for landing and take-off;
- b) runway visual range, when all changes of one or more steps on the reporting scale in use are being reported to the local air traffic services unit by an observer on the aerodrome.

Special reports shall also be made available to the operators and to other users at the aerodrome.

4.3.3 Recommendation.— *Reports of special observations indicating changes in accordance with the following criteria should be prepared as selected special reports:*

- a) *When the mean surface wind direction has changed by 30° or more from that given in the latest report, the mean speed before and/or after the change being 20 kt or more;*

b) *when the mean surface wind speed has changed by 10 kt or more from that given in the latest report, the mean speed before and/or after the change being 30 kt or more;*

c) *when the variation from the mean surface wind speed (gusts) has increased by 10 kt or more from that given in the latest report, the mean speed before and/or after the change being 15 kt or more;*

d) *when the visibility changes to or passes:*

1) *800 or 1 500 m, except that such reports are not required when runway visual range is given;*

2) *either 5 000 or 8 000 m, in cases where significant numbers of flights are operated in accordance with the visual flight rules; the value of either 5 000 or 8 000 m should be selected in accordance with the minimum visibility criteria in effect in the State concerned;*

e) *when the runway visual range changes to or passes 200, 400 or 800 m;*

f) *when a thunderstorm, hail, snow and rain mixed, freezing precipitation, drifting snow, duststorm, sandstorm, squall or funnel cloud (tornado or waterspout) begins or ends or changes in intensity;*

g) *when the height of base of cloud covering more than half of the sky changes to or passes 60, 150 or 300 m (200, 500 or 1 000 ft).*

4.3.4 When a deterioration of one weather element is accompanied by an improvement in another element, a single selected special report shall be issued; it shall then be treated as a deterioration report.

4.3.5 Recommendation.— *A selected special report representing a deterioration in conditions should be disseminated immediately after the observation. A selected special report representing an improvement in conditions should be disseminated only after the improvement has been maintained for 10 minutes; it should be amended before dissemination, if necessary, to indicate the conditions prevailing at the end of that 10-minute period. A selected special report representing a deterioration of one weather element and an improvement in another element should be disseminated immediately after the observation.*

4.3.6 Recommendation.— *Selected special reports should be disseminated beyond the aerodrome of origin in accordance with regional air navigation agreement.*

4.4 Observations and reports for take-off and landing

4.4.1 Recommendation.— *The agreement between the Meteorological Authority and the appropriate ATS Authority referred to in 4.1.2 should cover, amongst other things:*

- a) the provision in air traffic services units of indicators or instruments of the kind referred to in 4.5.4 (surface wind), 4.7.6 (runway visual range) and 4.11.2 (pressure) or in 4.1.7 (integrated automatic systems);*
- b) the calibration and maintenance of these indicators/instruments;*
- c) the use to be made of these indicators/instruments by air traffic services personnel;*
- d) as and where necessary, supplementary visual observations (for example, of meteorological phenomena of operational significance in the climb-out and approach areas) if and when made by air traffic services personnel to update or supplement the information supplied by the meteorological station;*
- e) meteorological information obtained from aircraft taking off or landing (for example, on wind shear);*
- f) if available, meteorological information obtained from ground weather radar.*

4.5 Observing and reporting of surface wind

4.5.1 Recommendation.— *The mean direction and the mean speed of the surface wind should be measured, as well as significant variations of the wind direction and speed. Since, in practice, the surface wind cannot be measured directly on the runway, surface wind observations for take-off and landing should be the best practicable indication of the winds which an aircraft will encounter during take-off and landing.*

4.5.2 Recommendation.— *For reports for take-off, the surface wind observations should be representative of conditions along the runway, and for reports for landing the observations should be representative of the touchdown zone. Surface wind information for take-off and landing should be representative of conditions at a height of 6 to 10 m (20-30 ft) above the runway. Surface wind observations made for reports disseminated beyond the aerodrome should be representative of conditions at a height of 6 to 10 m (20-30 ft) above the whole runway where there is only one runway and the whole runway complex where there is more than one runway.*

4.5.3 Recommendation.— *Representative surface wind observations should be obtained by the use of sensors appropriately sited as determined by local conditions. Sensors for*

surface wind observations for reports for take-off and landing should be sited to give the best practicable indication of conditions along the runway, e.g. lift-off and touchdown zones. At aerodromes where topography or prevalent weather conditions cause significant differences in surface wind at various sections of the runway, additional sensors should be provided.

4.5.4 Surface wind indicators relating to each sensor shall be located in the meteorological station with corresponding indicators in the appropriate air traffic services units. The indicators in the meteorological station and in the air traffic services units shall relate to the same sensors, and where separate sensors are required as specified in 4.5.3, the indicators shall be clearly marked to identify the runway and section of runway monitored by each sensor.

4.5.5 Recommendation.— *The averaging period for wind observations should be:*

- a) 10 minutes for reports disseminated beyond the aerodrome;*
- b) 2 minutes for reports used at the aerodrome for take-off and landing and for wind indicators in air traffic services units.*

4.5.6 Recommendation.— *In reports for take-off and landing, variations in the wind direction should be given when the total variation is 60° or more with mean speeds above 5 kt; such directional variations should be expressed as the two extreme directions between which the wind has varied during the past 10 minutes. Variations from the mean wind speed (gusts) during the past 10 minutes should be reported only when the variation from the mean speed has exceeded 10 kt; such speed variations (gusts) should be expressed as the maximum and minimum speeds attained. In reports for take-off, surface winds of 5 kt or less should include a range of wind directions, whenever possible.*

4.5.7 Recommendation.— *Where multiple sensors are installed, the 2-minute time averages of and significant variations in the surface wind direction and speed for each sensor used in reports for take-off and landing should be monitored by automatic equipment.*

4.5.8 Recommendation.— *In reports in abbreviated plain language, the wind direction and speed and significant variations thereof should be given; the wind direction should be given in three figures rounded to the nearest 10 degrees true, for example, 277° should be given as “280”; this should be followed by “/” and by the wind speed. The units used for speed should be knots and should not be indicated in the written form of the message; if units other than knots are used in connexion with wind speed they should be specified in the report. When directional variations are to be reported, the two extreme directions between which the wind has varied should be reported in degrees, for example, “VRB BTN 350/AND*

050/". When variations from the mean speed are to be reported they should be reported as the maximum and minimum values of the speed attained in knots in the form "MAX35 MNM10". When the wind is calm, this should be indicated by the term "CALM". In reports for take-off, light variable winds of 5 kt or less and variations in wind direction less than 180° should be indicated in the form "VRB BTN 350/AND 050/3"; in other reports variable wind direction should be indicated by the term "VRB" in the form "VRB3".

4.5.9 Recommendation.— In reports disseminated beyond the aerodrome:

- a) variations from the mean wind direction should not be given;
- b) maximum wind speed should be included only if it exceeds the mean speed by 10 kt or more;
- c) minimum wind speed should not be given.

4.6 Observing and reporting of visibility

4.6.1 Recommendation.— The horizontal visibility should be measured or be observed by reference to objects whose distance from the point of observation is known.

4.6.2 Recommendation.— For reports for take-off the visibility observations should be representative of the take-off and climb-out area, and for reports for landing the observations should be representative of the approach and landing area. Visibility observations made for reports disseminated beyond the aerodrome should be representative of the aerodrome and its immediate vicinity; in such observations special attention should be given to significant directional variations.

4.6.3 Recommendation.— In reports in abbreviated plain language, the name of the element should be given and the units used for visibility should be specified clearly. When the visibility is 5 km or less, it should be expressed in increments of 100 m, in the form "VIS 300M"; when it is more than 5 km, but less than 10 km, the units should be kilometres, in the form "VIS 7KM"; and when it is 10 km or more, it should be given as 10 km, except when the conditions for the use of CAVOK apply.

Note.— Specifications concerning the use of CAVOK are given in 4.13.3.

4.7 Observing and reporting of runway visual range

4.7.1 Recommendation.— Since, in practice, the runway visual range cannot be measured directly on the runway and in view of other limitations imposed by observation methods, a runway visual range observation should be the best possible assessment of the range over which the pilot of an aircraft on

the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line. For this assessment a height of approximately 5 m (15 ft) should be regarded as corresponding to the average eye level of a pilot in an aircraft.

Note.— Guidance on the subject of runway visual range is contained in the ICAO Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328-AN/908).

4.7.2 Recommendation.— Runway visual range observations should be representative of the touchdown zone and, as may be selected by the authority concerned, of the middle and far sections of the runway.

4.7.3 Recommendation.— Runway visual range observations should be made on all runways intended for use during periods of reduced visibility and in particular on:

- a) precision approach runways;
- b) runways used for take-off and having high-intensity edge lights and/or centre line lights.

Note.— Precision approach runways are defined in Annex 14, Chapter 1, under Instrument runway.

4.7.4 Recommendation.— Runway visual range observations should be carried out at a lateral distance from the runway centre line of not more than 120 m. The site for observations to be representative of the touchdown zone should be located about 300 m along the runway from the threshold. The sites for observations to be representative of the middle and far sections of the runway should be located at a distance of 1 000 to 1 500 m along the runway from the threshold and at a distance of about 300 m from the other end of the runway. The exact position of these sites and, if necessary, additional sites should be decided after considering aeronautical, meteorological and climatological factors such as long runways, swamps and other fog-prone areas.

4.7.5 Recommendation.— Runway visual range observations should be made, and the runway visual range reported, throughout periods when either the horizontal visibility or the runway visual range is observed to be less than 1 500 m.

4.7.6 Recommendation.— Where runway visual range is determined by instrumental means, one indicator — for example, recorder and dials — or more if required, should be located in the meteorological station with corresponding indicators, for example, dials or digital indicators, in the appropriate air traffic services units. The indicators in the meteorological station and in the air traffic services units should be connected to the same measuring device(s).

4.7.7 Recommendation.— Where a transmissometer is used for determination of runway visual range:

- a) the conversion of its readings should be based on the appropriate intensity of the runway lights;
- b) the averaging period of its readings should be a period of between 30 seconds and 1 minute; and
- c) its readings should be updated as necessary to permit the provision of current, representative values.

Note.— Guidance on the conversion of transmissometer readings into runway visual range is given in Attachment D.

4.7.8 Recommendation.— When instruments are used for determination of runway visual range, computations should be made separately for each available runway. The light intensity to be used for the computation should be:

- a) for a runway with the lights switched on, the light intensity actually in use on that runway;
- b) for a runway with lights switched off (or at the lowest setting pending the resumption of operations), the optimum light intensity that would be appropriate for operational use in the prevailing conditions.

4.7.9 Recommendation.— The units providing air traffic service and aeronautical information service for an aerodrome should be kept informed without delay of changes in the serviceability status of the runway visual range observing system.

4.7.10 Recommendation.— The reporting scale should consist of increments between 25 m and 60 m for runway visual range up to 800 m and increments of 100 m for runway visual range above 800 m. Where the observations are made by counting runway edge lights, the reporting increments should be determined largely by the spacing of those lights. Any observed value which does not fit the reporting scale in use should be rounded down to the nearest lower step in the scale.

4.7.11 Recommendation.— Fifty metres should be considered the lower limit for assessments of runway visual range. Below this limit reports should merely indicate that the runway visual range is less than 50 m, in the form “RVR BLW 50M”.

4.7.12 Recommendation.— Runway visual range should be reported to the appropriate local air traffic services units, whenever there is a change in the value to be reported in accordance with the reporting scale (except where the provisions of 4.3.2 a) or b) apply). The transmission of such reports should normally be completed within 15 seconds after the termination of the observation.

4.7.13 Recommendation.— In reports in abbreviated plain language the name of the element should be given in abbreviated form and the units used should be included, for

example, “RVR 400M”. When runway visual range is above the maximum value which can be determined by the system in use, it should be reported in the form “RVR ABOVE 1700M”; the use of this form of reporting should be limited to cases where runway visual range is above a value between 1 500 m and 2 000 m. When the runway visual range is below the minimum value which can be determined by the system in use, it should be reported, for example, in the form “RVR BLW 150M” where the figure 150 is the minimum value that can be determined by that system. If runway visual range is observed from one location along the runway, about 300 m from the threshold, it should be included without any indication of location. If the runway visual range is observed from more than one location along the runway, the value representative of the touchdown zone should be given first, followed by the values for the other locations along the runway, together with an indication of these locations, according to the method by which positions are notified in the Aeronautical Information Publication, for example, “RVR RWY 16 PSN A 600M PSN B 500M PSN C 400M”. When there is more than one runway in use, the available runway visual range values for each runway should be given and the runways to which the values refer should be indicated, for example, “RWY 26 RVR 500M RWY 20 RVR 800M”; if more than one runway is in use, but runway visual range is available only for one runway, that information should be indicated in the form “RWY 20 RVR 500M”.

4.7.14 Recommendation.— In reports disseminated beyond the aerodrome only the value representative of the touchdown zone should be given and no indication of location on the runway should be included. When there is more than one runway in use and there are significant differences in runway visual range between those runways, values for more than one runway should be included in accordance with agreement between the authorities and the operators concerned and the runways to which the values refer should be indicated in the form “RWY 26 RVR 500M RWY 20 RVR 800M”.

4.8 Observing and reporting of present weather

4.8.1 Recommendation.— For reports for take-off and landing, the present weather information should be representative, as far as is practicable, of the take-off and climb-out area or of the approach and landing area respectively. Observations of present weather made for reports disseminated beyond the aerodrome should be representative of the aerodrome and its immediate vicinity.

4.8.2 Recommendation.— The present weather phenomena which should be reported if they are occurring at or near the aerodrome are set out below, together with the relevant abbreviations and code figures. In reports in abbreviated plain language only the abbreviations should be used; in reports in the METAR and SPECI code forms the code figures and the abbreviations should be used.

Chapter 4

Drizzle — DZ	(50-53)
Heavy drizzle — XXDZ	(54-55)
Freezing drizzle — FZDZ	(56)
Heavy freezing drizzle — XXFZDZ	(57)
Recent drizzle — REDZ	(20)
Dust devils — PO	(08)
Dust haze — HZ	(05-06)
Duststorm, sandstorm, rising dust or sand — SA	(07,30-32)
Heavy duststorm or sandstorm — XXSA	(33-35)
Fog — FG	(42-47)
Fog patches — BCFG	(40-41)
Freezing fog — FZFG	(48-49)
Shallow fog — MIFG	(11-12)
Funnel cloud (tornado or waterspout) — FC	(19)
Hail — GR	(89, 93)
Heavy hail — XXGR	(90, 94)
Soft hail — GR	(87-88)
Recent hail — REGR	(27)
Mist — BR	(10)
Rain — RA	(58-63, 91)
Heavy rain — XXRA	(64-65, 92)
Freezing rain — FZRA	(66)
Heavy freezing rain — XXFZRA	(67)
Rain and snow — RASN	(68)
Heavy rain and snow — XXRASN	(69)
Recent rain — RERA	(21)
Recent freezing rain — REFZRA	(24)
Recent rain and snow — RERASN	(23)
Showers — RASH	(80)
Heavy showers — XXSH	(81-82)
Showers of rain and snow — RASN	(83)
Heavy showers of rain and snow — XXRASN	(84)
Snow showers — SNSH	(85)
Heavy snow showers — XXSNSH	(86)
Recent showers — RESH	(25)
Recent snow showers — RESNSH	(26)
Smoke — FU	(04)
Snow — SN	(70-73)
Blowing snow — BLSN	(38-39)
Low drifting snow — DRSN	(36-37)
Heavy snow — XXSN	(74-75)
Ice pellets — PE	(79)
Recent snow — RESN	(22)
Snowgrains — SG	(77)

Annex 3 — Meteorological Service for International Air Navigation

Squall — SQ	(18)
Thunderstorm — TS	(17,95)
Heavy thunderstorm — XXTS	(97)
Thunderstorm with hail — TSGR	(96)
Thunderstorm with duststorm or sandstorm — TSSA	(98)
Heavy thunderstorm with hail — XXTSGR	(99)
Recent thunderstorm — RETS	(29)

4.8.3 Recommendation.— The modifier “recent” should be applied, if the phenomenon was observed during the hour preceding the time of observation. This modifier should be used only in reports disseminated beyond the aerodrome of origin and only in accordance with regional air navigation agreement.

4.9 Observing and reporting of cloud

4.9.1 Recommendation.— Cloud amount, type and height of base should be observed as necessary to describe the general cloud distribution.

4.9.2 Recommendation.— Cloud observations for reports for landing should be representative of the approach area or, in the case of aerodromes with precision approach runways, of the middle marker site of the instrument landing system. Cloud observations made for reports disseminated beyond the aerodrome should be representative of the aerodrome and its immediate vicinity.

Note.— Specifications concerning the middle marker site of an instrument landing system are given in Annex 10, Volume I, Part I.

4.9.3 Recommendation.— The height of the base of cloud should normally be reported above aerodrome elevation. When a precision approach runway is in use which has a threshold elevation 15 m (50 ft) or more below the aerodrome elevation, local arrangements should be made in order that the height of clouds reported to arriving aircraft should refer to the threshold elevation.

4.9.4 Recommendation.— In reports in abbreviated plain language, cloud amount should be given in oktas, for example, “6/8”. If there are no clouds, and the term “CAVOK” is not appropriate, the term “SKC” should be used. When the sky is obscured and information on vertical visibility is available, it should be reported in the form “VER VIS”, followed by the value of the vertical visibility and the units used. When several layers or masses of cloud are observed, their amount and height should be reported in the following order:

- the lowest layer or mass, regardless of amount;
- the next layer or mass, covering more than 2/8;

- c) the next higher layer or mass, covering more than 4/8;
- d) cumulonimbus clouds, whenever observed and not reported in a) to c) above.

The type of cloud needs to be reported only for cumulonimbus when it is observed at or near the aerodrome. This should be given as “CB”. The height of base of cloud should be given, together with the units used, in the form “500M” or “500FT”. When the cloud base is diffuse or ragged or fluctuating rapidly, the minimum height of the cloud, or cloud fragments, should be given, followed by the relevant term “DIF” or “RAG” or “FLUC”.

4.10 Observing and reporting of air temperature and dew-point temperature

4.10.1 **Recommendation.**— The air temperature and the dew-point temperature should be reported in whole degrees Celsius.

4.10.2 **Recommendation.**— Observations of air temperature and dew-point temperature should be representative of the runways.

4.10.3 **Recommendation.**— In reports in abbreviated plain language, the air temperature should be identified by “T” and the dew-point temperature by “DP” in the form “T21 DP8”. For a temperature below 0°C the value should be preceded by “MS”

4.10.4 **Recommendation.**— In reports disseminated beyond the aerodrome of origin air temperature and dew-point temperature should be included in accordance with regional air navigation agreement.

4.11 Observing and reporting of pressure values

4.11.1 **Recommendation.**— The atmospheric pressure should be measured and QNH and/or QFE values should be computed in tenths of a millibar.

4.11.2 **Recommendation.**— For local air traffic services units QNH and, if required, QFE should be kept current by routine issues, supplemented by the issue of new data whenever changes occur which exceed an agreed magnitude. Such supplementary data need not be issued when the air traffic services unit is equipped with a remote indicator from the barometer in the meteorological station or with a separate barometer, and where arrangements are in force for the use of the remote indicator, or separate barometer, to make observations to meet the need for reports for landing and take-off.

4.11.3 **Recommendation.**— The reference level for the computation of QFE should be the aerodrome elevation. For instrument runways, the thresholds of which are 2 m (6 ft) or more below the aerodrome elevation, and for precision approach runways, the QFE, if required, should refer to the relevant threshold elevation.

4.11.4 **Recommendation.**— In routine reports disseminated at the aerodrome QNH should be included regularly and QFE should be included either on request or, if so agreed locally, on a regular basis. Those values should be rounded down to the nearest lower whole millibar. For example, QNH 995.6 mb should be given as “QNH 995”.

4.11.5 **Recommendation.**— In routine reports disseminated beyond the aerodrome of origin QNH values should be included in accordance with regional air navigation agreement. Those values should be rounded down to the nearest lower whole millibar.

4.12 Observing and reporting of supplementary information

4.12.1 **Recommendation.**— Observations made at aerodromes should include the available supplementary information concerning significant meteorological conditions, particularly those in the approach and climb-out areas, and specifically the location of cumulonimbus or thunderstorm, moderate or severe turbulence, wind shear, hail, severe line squall, moderate or severe icing, freezing precipitation, marked mountain waves, sandstorm, duststorm, blowing snow or funnel cloud (tornado or waterspout). Where practicable, the information should identify the vertical extent and direction and rate of movement of the phenomenon. As icing, turbulence and to a large extent, wind shear, for the time being cannot be satisfactorily observed from the ground, evidence of their existence should be derived from aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5, 5.5.1.

Note.— The preparation and dissemination of warnings of wind shear in the climb-out and approach paths is dealt with in Chapter 7, 7.4.1 to 7.4.5.

4.12.2 **Recommendation.**— Significant directional variations in visibility, particularly those affecting the approach area, should be observed and reported.

4.12.3 **Recommendation.**— The available supplementary information should be included in abbreviated plain language. Wind shear in the approach area should be reported, for example, as “SURFACE WIND 320/10 WIND AT 60M 360/25 IN APCH”. Moderate turbulence and icing in cloud in the climb-out area should be reported as “MOD TURB AND ICE INC IN CLIMB-OUT”. Directional variations in visibility should be reported with an indication of the direction of observation, for example, “VIS 2000M TO S”.

4.12.4 Recommendation.— *Where fog dispersal operations are being carried out this should be indicated by adding the term “DENEb”.*

4.12.5 Recommendation.— *Significant directional variations in visibility, indications of fog dispersal operations and information on wind shear should be added in reports disseminated beyond the aerodrome, while other supplementary information should be added in such reports only in accordance with regional air navigation agreement.*

4.13 Contents of reports

4.13.1 Recommendation.— *Routine reports should contain the following information in the order indicated:*

- a) identification of the type of report;*
- b) location indicator;*
- c) time of the observation;*
- d) surface wind direction and speed;*
- e) visibility;*
- f) runway visual range, when applicable;*
- g) present weather;*
- h) cloud amount, type (in reports in abbreviated plain language only for cumulonimbus at or near the aerodrome) and height of base;*
- i) air temperature and dew-point temperature;*
- j) QNH and, when applicable, QFE;*
- k) supplementary information.*

Note.— *The location indicators referred to under b) and their significations are published in ICAO Doc 7910 — Location Indicators.*

4.13.2 Recommendation.— *Special reports should contain the same information as routine reports and in the same order, except that air temperature, dew-point temperature and QNH/QFE values need not be included.*

4.13.3 When the following conditions obtain simultaneously at the time of observation:

- a) visibility, 10 km or more;
- b) no cloud below 1 500 m (5 000 ft) or below the highest minimum sector altitude, whichever is greater, and no cumulonimbus;

- c) no precipitation, thunderstorm, shallow fog or low drifting snow;

information on visibility, runway visual range, present weather and cloud amount, type and height shall be replaced in all meteorological reports by the term “CAVOK”.

4.13.4 Recommendation.— *Where reports for take-off and landing are required by the local aerodrome control tower and/or approach control office, the contents of such reports should be determined by local agreement. All elements included in reports for take-off and landing should be based on observations which are representative of conditions existing immediately prior to the transmission of the report.*

4.14 Format of reports

4.14.1 Routine and special reports and, where required, reports for take-off and landing, which are not disseminated beyond the aerodrome of origin shall be in a form agreed with the air traffic services units, operators and other aeronautical users concerned.

4.14.2 Routine and selected special reports which are exchanged between meteorological offices shall be:

- a) in the METAR or SPECI code forms prescribed by the World Meteorological Organization; or
- b) when agreed between the Meteorological Authorities concerned, in abbreviated plain language or in teletype-writer characters and symbols, the significance of which has been agreed upon by the Meteorological Authorities concerned.

Note.— *The METAR and SPECI code forms are contained in WMO Publication No. 306, Manual on Codes, Volume I.*

4.14.3 Recommendation.— *Routine reports in the METAR code form and selected special reports in the SPECI code form should normally contain all information which the codes provide for, except the meteorological elements given in optional groups which should be included in accordance with regional air navigation agreement.*

4.14.4 Recommendation.— *Routine reports from aeronautical meteorological stations not at international aerodromes should, when disseminated in a code form prescribed by the World Meteorological Organization, be in the METAR code form except that, if so desired by the Meteorological Authority responsible for their preparation, they may be in the SYNOP code form.*

4.14.5 Reports in abbreviated plain language shall convey to aeronautical personnel a directly intelligible meaning through the use of:

- a) abbreviations approved by ICAO for use in the international aeronautical telecommunication service; and
- b) numerical values of self-explanatory nature,

supplemented, if suitable approved abbreviations are not available, by the vocabulary of a national language, taken with its usual meaning in aviation. With the exception of QNH and QFE, no signals of the Q Code shall be used in such reports.

Note.— The abbreviations referred to under a) are contained in the Procedures for Air Navigation Services — ICAO Abbreviations and Codes (Doc 8400)

4.14.6 Recommendation.— Routine reports in abbreviated plain language should be identified as “MET REPORT” and special and selected special reports as “SPECIAL”.

When a group of routine reports is disseminated, the identifier need only be used with the first report; in the case of special and selected special reports the identifier should always be included with each report. The actual time of making the observation should be given in hours GMT and minutes, using four figures in the form “2230”. The letters “GMT” should not be included in the message. When a group of reports is included in a message, the actual time of the first report contained in the message should be given; the time of any other report included in the message should be given only if it differs from the time of the first report by more than 10 minutes.

4.14.7 Recommendation.— The terminology, units and scales employed in reports for take-off and landing should be the same as those used in routine, special and selected special reports for the same aerodrome.

EXAMPLES OF REPORTS

Example 1.— Routine report

- a) *METAR for YUDO (Donlon/International)*:*

METAR YUDO 1630 24008 0600 R 1000 42FG 3SC010 17/16 1018

- b) *Abbreviated plain-language report (same location and weather conditions as METAR):*

MET REPORT YUDO 1630 240/8 VIS 600M RVR 1000M FG 3/8 1000FT T17 DP16 QNH 1018

- c) *Meaning of both reports:*

Routine report for Donlon/International* at 1630 GMT; surface wind direction 240 degrees; wind speed 8 knots; visibility 600 metres; runway visual range 1 000 metres; fog (the plain-language version does not give the code figure); 3 oktas of stratocumulus cloud at 1 000 feet (the plain-language version does not give the cloud type); air temperature 17 degrees Celsius; dew-point temperature 16 degrees Celsius; QNH 1018 millibars.

* Fictitious location

*Example 2.— Selected special report*a) *SPECI for YUDO (Donlon/International)*:*

SPECI YUDO 1115 05025/37 2500 95TS 7CB005

b) *Abbreviated plain-language report (same location and weather conditions as SPECI):*

SPECIAL YUDO 1115 050/25 MAX37 VIS 2500M TS 7/8 CB 500FT

c) *Meaning of both reports:*

Selected special report for Donlon/International* at 1115 GMT; surface wind direction 50 degrees; wind speed 25 knots with gusts to 37 knots; visibility 2 500 metres; thunderstorm (the plain-language version does not give the code figure); 7 oktas of cumulonimbus cloud at 500 feet.

* Fictitious location

CHAPTER 5. AIRCRAFT OBSERVATIONS AND REPORTS

5.1 Obligations of States

5.1.1 Each Contracting State shall arrange, according to the provisions of this chapter, for observations to be made by aircraft of its registry operating on international air routes and for the recording and reporting of these observations.

5.2 Aircraft observations

5.2.1 The following aircraft observations shall be made:

- a) routine aircraft observations;
- b) special aircraft observations;
- c) aircraft observations during climb-out and approach; and
- d) other aircraft observations on request.

5.3 Routine aircraft observations

5.3.1 Routine observations shall be made in relation to those air traffic services reporting points or intervals:

- a) at which the applicable air traffic services procedures require routine position reports; and
- b) which are those separated by distances corresponding most closely to intervals of one hour of flying time.

5.3.2 An aircraft shall be exempted from making routine observations when:

- a) the flight duration is 2 hours or less; or
- b) the aircraft is at a distance equivalent to less than one hour of flying time from the next intended point of landing; or
- c) the altitude of the flight path is below 1 500 m (5 000 ft).

5.3.3 **Recommendation.**— *Additional exemptions may be prescribed by regional air navigation agreement for flights over routes and areas with high density air traffic and/or with adequate synoptic networks. Such procedures should take the form of exemption or designation procedures and should:*

- a) make it possible for the minimum requirements for aircraft observations of all meteorological offices concerned to be met;*
- b) take into consideration the need for data for the planning of high-level operations of the future;*
- c) be as simple as possible to implement and preferably be of a routine nature not involving consideration of individual cases;*
- d) be such that, as far as practicable, all offices involved are aware of the aircraft from which observations should be available.*

5.4 Special aircraft observations

5.4.1 Special observations shall be made by all aircraft operating on international air routes whenever:

- a) severe turbulence or severe icing is encountered; or
- b) moderate turbulence, hail or cumulonimbus clouds are encountered during transonic or supersonic flight; or
- c) other meteorological conditions, for example, the other en-route weather phenomena specified for SIGMET messages, are encountered which, in the opinion of the pilot-in-command, may affect the safety or markedly affect the efficiency of other aircraft operations.

5.5 Aircraft observations during climb-out and approach

5.5.1 Observations shall be made by all aircraft of meteorological conditions encountered during the climb-out or approach phases of flight, not previously reported to the pilot-in-command, which in his opinion are likely to affect the safety of other aircraft operations.

Note.— *According to Chapter 4, 4.12.1 and Chapter 7, 7.4.2, icing, turbulence and, to a large extent, wind shear, are elements which, for the time being, cannot be satisfactorily observed from the ground and for which in most cases aircraft observations represent the only available evidence.*

5.5.2 **Recommendation.**— *Where wind shear conditions in the climb-out or approach phases of flight were reported or forecast but not encountered, the pilot-in-command should advise the appropriate air traffic services unit as soon as prac-*

licable unless, when about to take off or land, he is aware that the appropriate air traffic services unit has already been so advised by a preceding aircraft.

5.6 Other aircraft observations

5.6.1 Observations shall also be made by aircraft:

- a) if a meteorological office providing meteorological service for a flight makes a request for specific data; or
- b) by agreement between a Meteorological Authority and an operator.

5.7 Record of aircraft observations

5.7.1 Routine and special aircraft observations shall be recorded on the AIREP form. A copy of the form shall be included with the flight documentation unless it has been supplied by the operator.

Note.— The AIREP form and detailed instructions for recording and reporting aircraft observations and for the contents and format of AIREP messages are given in the Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services (Doc 4444-RAC/501), Appendix 1.

5.7.2 **Recommendation.**— *Aircraft observations requested by a meteorological office, or made by agreement between a Meteorological Authority and an operator, should be recorded only when this is specifically agreed upon; they should then be recorded on the AIREP form.*

5.8 Reporting of aircraft observations during flight

5.8.1 Routine aircraft observations shall be reported during flight as routine air-reports at times of transmission of the associated position report. Special aircraft observations shall be reported during flight as special air-reports, as soon after they have been made as is practicable.

5.8.2 Aircraft observations made during the climb-out and approach phase of flight shall be reported as soon as is practicable.

5.8.3 **Recommendation.**— *When reporting aircraft observations of wind shear encountered during the climb-out and approach phases of flight the aircraft type should be included.*

5.8.4 **Recommendation.**— *Aircraft observations requested by a meteorological office, or made by agreement between a Meteorological Authority and an operator, should be reported in flight, unless it has been agreed that such*

reporting is not necessary. If they are reported, they should be addressed so as to reach the office or authority that requested the observations.

5.8.5 The elements contained in air-reports and their order in the AIREP message shall be:

	Message type designator
Section 1 (Position information)	Aircraft identification Position Time Flight level or altitude Next position and time over
Section 2 (Operational information)	Estimated time of arrival Endurance
Section 3 (Meteorological information)	Air temperature Wind Turbulence Aircraft icing Supplementary information

Note.— The message type designators specified in the Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services (Doc 4444-RAC/501), Appendix 1, are “ARP” for routine air-reports and “ARS” for special air-reports.

5.8.6 The Meteorological Authority concerned shall make such arrangements with the appropriate ATS Authority as are necessary to ensure that the meteorological observations reported by aircraft in flight to air traffic services units are delivered to the associated meteorological office without delay.

5.9 Post-flight reporting

5.9.1 On arrival of a flight at an aerodrome, the completed AIREP form shall be delivered by the operator or a flight crew member, without delay, to the aerodrome meteorological office, or if such office is not easily accessible to arriving flight crew members, the completed form shall be dealt with in accordance with local arrangements made by the Meteorological Authority and the operator.

5.9.2 **Recommendation.**— *Oral information on the meteorological conditions experienced during the flight should be given by a flight crew member to supplement the information contained on the AIREP form.*

5.10 Exchange of air-reports between meteorological offices

5.10.1 Air-reports received by a meteorological office shall be disseminated to the meteorological office designated

as a collecting centre in accordance with regional air navigation agreement, unless there is evidence that the reports have already been received by a collecting centre.

5.10.2 Recommendation.— *The air-reports to be disseminated in accordance with 5.10.1 should include meteorological information derived from AIREP forms and from oral information by a flight crew member.*

5.10.3 The collecting centres shall assemble the routine air-reports received and shall disseminate them to other meteorological offices in accordance with regional air navigation agreement. The exchange of collectives on an hourly basis may be found desirable when reports are numerous.

5.10.4 Special air-reports received by a collecting centre or other meteorological office shall be disseminated, as soon after they have been received as is practicable, to other meteorological offices in accordance with regional air navigation agreement.

5.10.5 The collecting centre shall transmit the air-reports received to its National Meteorological Centre, or to other meteorological centres designated by agreement between the

Aeronautical and Meteorological Authorities concerned, for further dissemination as basic meteorological data.

5.10.6 Recommendation.— *Where supplementary dissemination of air-reports is required to satisfy special aeronautical or meteorological requirements, such dissemination should be arranged between the Meteorological Authorities concerned.*

5.10.7 Recommendation.— *Air-reports received more than 8 hours after their related time of observation should only be disseminated by collecting centres if more recent reports from the area concerned are not available.*

5.10.8 Air-reports shall be exchanged between meteorological offices in the format in which they are received, except that:

- a) Section 1, Item 5 — Next position and time over, and Section 2 — Operational information, may be omitted; and
- b) when the position is given by reference to a reporting point it may be converted, by a meteorological office, into the corresponding latitude and longitude.

CHAPTER 6. FORECASTS

6.1 Interpretation and use of forecasts

6.1.1 Owing to the variability of meteorological elements in space and time, to limitations of forecasting techniques and to limitations caused by the definitions of some of the elements, the specific value of any of the elements given in a forecast shall be understood by the recipient to be the most probable value which the element is likely to assume during the period of the forecast. Similarly, when the time of occurrence or change of an element is given in a forecast, this time shall be understood to be the most probable time.

Note.— Guidance on the operationally desirable accuracy of forecasts is given in Attachment E.

6.1.2 The issue of a new forecast by a meteorological office, such as a routine aerodrome forecast, shall be understood to cancel automatically any forecast of the same type previously issued for the same place and for the same period of validity or part thereof.

6.2 Aerodrome forecasts

6.2.1 An aerodrome forecast shall be prepared by the meteorological office designated by the Meteorological Authority concerned.

6.2.2 An aerodrome forecast shall consist of a concise statement of the expected meteorological conditions at an aerodrome during a specified period; it shall include surface wind, visibility, weather and cloud.

6.2.3 **Recommendation.**— *Additional elements should be included in aerodrome forecasts for local dissemination as agreed between the Meteorological Authority and the operators concerned.*

6.2.4 Meteorological offices preparing aerodrome forecasts shall keep the forecasts under continuous review and, when necessary, shall issue amendments promptly. The length of the forecast messages and the number of changes indicated in the forecast shall be kept to a minimum.

6.2.5 **Recommendation.**— *The criteria used for the inclusion of change groups in aerodrome forecasts or for the amendment of aerodrome forecasts should be consistent with the criteria used for selected special reports.*

6.2.6 **Recommendation.**— *The period of validity of routine aerodrome forecasts should be not less than 9 hours nor more than 24 hours; this period should be determined by regional air navigation agreement. Routine aerodrome fore-*

casts valid for less than 12 hours should be issued every 3 hours and those valid for 12 to 24 hours should be issued every 6 hours.

6.2.7 **Recommendation.**— *Aerodrome forecasts and amendments to aerodrome forecasts which are disseminated locally should be in the form prescribed for the exchange of such information between meteorological offices, or in another form as agreed locally.*

6.2.8 Aerodrome forecasts and amendments thereto which are exchanged between meteorological offices shall be:

- a) in the TAF code form prescribed by the World Meteorological Organization;
- b) in abbreviated plain language; or
- c) in teletypewriter characters and symbols, the significance of which has been agreed upon by the Meteorological Authorities concerned.

Note.— The TAF code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.

6.2.9 **Recommendation.**— *Aerodrome forecasts should be exchanged in the TAF code form except as otherwise determined by regional air navigation agreement, or by agreement between the Meteorological Authorities concerned.*

6.2.10 **Recommendation.**— *Aerodrome forecasts in the TAF code form should contain all information for which the code provides except that the optional groups should be used in accordance with regional air navigation agreement or agreement between the Meteorological Authorities concerned. Changes and probabilities should be indicated using the appropriate abbreviation, for example, "GRADU 1316" (meaning gradually between 1300 GMT and 1600 GMT); the figure code for the change indicator should not be used.*

6.2.11 **Recommendation.**— *An aerodrome forecast in abbreviated plain language should be identified as "FCST" and an amendment thereto as "AMD FCST". The period of validity of the forecast should be given in a time group indicating the beginning and the end of that period by two figures each, separated by "/"; for example, a period of validity from 1200 GMT to 2100 GMT should be given as "12/21".*

6.2.12 **Recommendation.**— *The order of the elements and the terminology, units and scales used in aerodrome forecasts in abbreviated plain language should be the same as those used in routine and special reports for the same*

EXAMPLES OF AERODROME FORECASTS

a) TAF for YUDO (Donlon/International)*:

TAF YUDO 0918 13010 9000 6SC020 GRADU 1316 3000 50DZ 8ST006

b) Abbreviated plain language (same location and weather conditions):

FCST YUDO 09/18 130/10 VIS 9KM 6/8 2000FT GRADU 13/16 VIS 3000M DZ 8/8 600FT

c) Meanings of both forecasts:

Aerodrome forecast for Donlon/International* valid from 0900 GMT to 1800 GMT; surface wind direction 130 degrees; wind speed 10 knots; visibility 9 kilometres; 6 oktas of stratocumulus cloud at 2 000 feet (the plain-language version does not give the cloud type); gradual change between 1300 GMT and 1600 GMT with visibility becoming 3 kilometres in drizzle and 8 oktas of stratus cloud at 600 feet.

* Fictitious location

aerodrome. Changes and probabilities should be indicated in such forecasts by means of the same abbreviations as are used in forecasts for the same aerodrome prepared in the TAF code form.

6.3 Landing forecasts

6.3.1 A landing forecast shall be prepared by the meteorological office designated by the Meteorological Authority concerned; such forecasts are intended to meet requirements of local users and of aircraft within about one hour's flying time from the aerodrome.

6.3.2 **Recommendation.**— *Landing forecasts should be prepared either in the form of a self-contained forecast or in the form of a trend-type forecast, as determined by regional air navigation agreement.*

6.3.3 A self-contained landing forecast shall consist of a concise statement of the expected meteorological conditions at the aerodrome concerned and it shall contain any or all of the elements surface wind, visibility, significant weather and cloud. Other significant information shall be included as agreed between the Meteorological Authority and the operator concerned. The period of validity of a self-contained landing forecast shall not exceed 2 hours from the time of issue.

6.3.4 A trend-type landing forecast shall consist of a routine, special or selected special report for an aerodrome to which is appended a concise statement of the expected trend

of the meteorological conditions at that aerodrome. The period of validity of a trend-type landing forecast shall be 2 hours from the time of the report which forms part of the landing forecast. The trend-type landing forecast shall indicate changes in respect of one or more of the elements surface wind, visibility, weather and cloud. Only those elements shall be included for which a change is expected. When no change is expected to occur, this shall be indicated by the term "NOSIG", in both the METAR code form and the abbreviated plain-language version.

6.3.5 **Recommendation.**— *Elements other than surface wind, visibility, weather and cloud should, if so agreed between the Meteorological Authority and the operator concerned, be included in a trend-type landing forecast.*

6.3.6 When a change is expected to occur, the trend part of the trend-type forecast message shall begin with one of the change indicators "GRADU", "RAPID", "TEMPO", "INTER" or "TEND". The time group is used only when appropriate and shall follow the change indicator. Dependent on the change indicator used, this group indicates either the time of the change or the beginning of the period during which the change is expected to take place. For example, a gradual change expected to commence at 1730 GMT shall be indicated in the form "GRADU 1730HR" (METAR code form), or "GRADU 1730" (abbreviated plain language). The change indicators shall be used as follows:

- a) "GRADU" shall be used if the changes are expected to take place at an approximately constant rate throughout the forecast period, or during a specified part thereof;

- b) “RAPID” shall be used instead of “GRADU” when the changes are expected to take place during a period lasting less than half an hour;
- c) “TEMPO” shall be used if the changes are expected to last for a period of less than one hour and changes take place sufficiently infrequently for the prevailing conditions to remain those of the report;
- d) “INTER” shall be used if the changes are expected to occur frequently for short periods of time, the conditions fluctuating almost constantly between those in the report or those in the preceding part of the forecast, and those in the forecast itself;
- e) “TEND” shall be used if none of the terms “GRADU”, “RAPID”, “TEMPO” and “INTER” applies. It shall not be used if some other indicator has already appeared in the preceding part.

6.3.7 The indicator “PROB” shall not be used in trend-type landing forecasts.

6.3.8 The trend part of the trend-type landing forecast shall indicate changes in the surface wind which involve:

- a) a change in the mean wind direction of 30° or more, the mean speed before and/or after the change being 20 kt or more;
- b) a change in mean wind speed of 10 kt or more, the mean speed before and/or after the change being 30 kt or more.

For example, an expected intermittent surface wind from 250° at 35 kt with maximum speeds (gusts) to 50 kt shall be indicated in the form “INTER 250/35 MAX50” (abbreviated plain language).

6.3.9 When the visibility is expected to change to or pass any one of the values 200, 400, 600, 800, 1 500 or 3 000 m, the trend part of the trend-type landing forecast shall indicate the change. When significant numbers of flights are conducted in accordance with the visual flight rules, the forecast shall additionally indicate changes to or passing either 5 000 m or 8 000 m, the value of 5 000 or 8 000 m being selected in accordance with the minimum visibility criteria in effect in the State concerned. For example, a temporary reduction of the visibility to 750 m in fog shall be rounded down to 700 m and indicated in the form “TEMPO 0700” (METAR code form) or “TEMPO VIS 700M” (abbreviated plain language).

6.3.10 When the onset or cessation of a thunderstorm or freezing precipitation is expected, the trend part of the trend-type landing forecast shall indicate changes. For example, intermittent freezing rain shall be indicated in the form “INTER 66FZRA” (METAR code form) or “INTER FZRA” (abbreviated plain language). The expected end of

occurrence of those phenomena shall be indicated by “WX NIL”. For example, an expected rapid cessation at 1630 GMT of significant weather, such as a thunderstorm, shall be indicated in the form “RAPID 1630HR WX NIL” (METAR code form) or “RAPID 1630 WX NIL” (abbreviated plain language).

6.3.11 When the height of the base of cloud covering more than 4 oktas is below or is expected to fall below 450 m (1 500 ft), the trend part of the trend-type landing forecast shall indicate changes to or passing any one of the following values: 30, 60, 90, 150, 300 and 450 m (100, 200, 300, 500, 1 000 and 1 500 ft). When the height of the base of cloud is below or is expected to fall below 450 m (1 500 ft), the trend part of the trend-type landing forecast shall also indicate changes in cloud amount from 4 oktas or less to more than 4 oktas, or changes from more than 4 oktas to 4 oktas or less. For example, a trend from 4 oktas or less towards 8 oktas of stratus cloud at 300 m (1 000 ft) shall be indicated in the form “TEND 8ST010” (METAR code form) or “TEND 8/8 300M” (abbreviated plain language).

6.3.12 The order of the elements and the terminology, units and scales used in the trend part of the trend-type landing forecast shall be the same as those used in the report to which it is appended.

6.4 Forecasts for take-off

6.4.1 A forecast for take-off shall be prepared by the meteorological office designated by the Meteorological Authority concerned.

6.4.2 **Recommendation.**— *A forecast for take-off should refer to a specified period of time and should contain information on expected conditions over the runway complex in regard to surface wind direction and speed and any variations thereof, temperature, pressure (QNH), and any other elements as agreed locally.*

6.4.3 **Recommendation.**— *A forecast for take-off should be supplied to operators and flight crew members on request within the 3 hours before the expected time of departure.*

6.4.4 **Recommendation.**— *The format of the forecast should be as agreed between the Meteorological Authority and the operator concerned. The order of the elements and the terminology, units and scales used in forecasts for take-off should be the same as those used in reports for the same aerodrome.*

6.5 Area and route forecasts, other than forecasts issued by regional area forecast centres

Note.— *Provisions concerning forecasts issued within the framework of the world area forecast system are contained in Chapter 3.*

6.5.1 Area and route forecasts shall contain upper winds, upper-air temperatures, significant en-route weather phenomena and associated clouds. Other elements may be added as required. This information shall cover the flight operations for which they are intended in respect of time, altitude and geographical extent.

6.5.2 **Recommendation.**— *When the density of traffic operating below flight level 100 warrants the routine issue and dissemination of area forecasts for such operations, the frequency of issue and the fixed time or period of validity of those forecasts should be determined by the Meteorological Authority in consultation with the users.*

6.5.3 Meteorological offices preparing area and route forecasts shall keep the forecasts under continuous review and issue amendments as necessary.

6.5.4 A list of criteria to be used for amendments to area and route forecasts shall be established by the Meteorological Authority, in consultation with operators and other users concerned.

6.5.5 **Recommendation.**— *The list of criteria should call for the issue of amendments to area and route forecasts when the following changes are expected:*

Upper wind	Change in direction of 30° or more, provided the wind speed is 30 kt or more before or after the change; change in speed of 20 kt or more.
Upper-air temperatures	Change of more than 5°C.

Aircraft icing and turbulence	New expectation; intensity increasing; intensity decreasing from severe to light or from moderate to nil.
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Other significant en-route weather phenomena	New expectation; no longer expected.
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6.5.6 Area and route forecasts, and amendments thereto, disseminated locally, shall be in one of the forms prescribed for the exchange of such information between meteorological offices or in another form as agreed locally.

6.5.7 Area and route forecasts and amendments thereto which are exchanged between meteorological offices in a code form prescribed by the World Meteorological Organization shall be in the ARFOR, ARMET or ROFOR code form.

Note.— *The ARFOR, ARMET and ROFOR code forms are contained in WMO Publication No. 306, Manual on Codes, Volume I.*

6.5.8 **Recommendation.**— *The order of the elements in area and route forecasts (or amendments thereto) in abbreviated plain language should normally follow that of the corresponding coded form of message. The terminology and units employed should be consistent with those used in the related aerodrome reports and forecasts. The identifier employed should be “AREA FCST” or “ROUTE FCST” respectively, preceded in the case of amendments by “AMD”. The CAVOK procedure applied in aerodrome forecasts should not be used in area and route forecasts.*

CHAPTER 7. SIGMET INFORMATION, AERODROME WARNINGS AND WIND SHEAR WARNINGS

7.1 SIGMET information — general provisions

7.1.1 SIGMET information shall be issued by a meteorological watch office and shall give a concise description of specified en-route weather phenomena, which may affect the safety of aircraft operations, and of the development of those phenomena in time and space. The information shall include the occurrence and/or expected occurrence of one or more of the following:

a) at subsonic cruising levels:

- active thunderstorms
- tropical cyclone
- severe line squall
- heavy hail
- severe turbulence
- severe icing
- marked mountain waves
- widespread sandstorm/duststorm;

b) at transonic levels and supersonic cruising levels:

- moderate or severe turbulence
- cumulonimbus clouds
- hail.

Note.— The requirement to issue SIGMET information regarding active thunderstorms refers to the occurrence or expected occurrence of an area of widespread cumulonimbus clouds or cumulonimbus along a line with little or no space between individual clouds, or to cumulonimbus embedded in cloud layers or concealed by haze. It does not refer to isolated or scattered cumulonimbus not embedded in cloud layers or concealed by haze.

7.1.2 Recommendation.— *SIGMET information should not contain unnecessary descriptive material. For example, messages concerning an active thunderstorm area, a tropical cyclone or a severe line squall should not include references to associated turbulence, icing or hail, unless the associated phenomena are considered to warrant special attention. In tropical areas, during periods when thunderstorm activity is a frequent occurrence, SIGMET information relating to that phenomenon should only be issued in respect of intense or widespread thunderstorms.*

7.1.3 SIGMET information shall be cancelled when the phenomena are no longer occurring or are no longer expected to occur in the area.

7.2 Format and exchange of SIGMET messages

7.2.1 A SIGMET message shall contain the following information as necessary and in the order indicated:

- a) identification of the meteorological watch office originating the message; for example, YUDO;
- b) message identification and sequence number; for example, SIGMET 5;
- c) period of validity; for example, valid from 1215 GMT to 1600 GMT;
- d) phenomenon causing the message; for example, severe turbulence;
- e) description of the phenomenon; for example, in clear air;
- f) indication whether the information is observed or forecast and related time; for example, observed at 1210 GMT;
- g) location and level; for example, over DONLON at flight level 250;
- h) movement or expected movement; for example, moving east at 20 kt;
- i) changes in intensity; using, as appropriate, the terms “intensifying”, “weakening” or “no change”.

7.2.2 SIGMET messages shall be prepared in abbreviated plain language, using approved ICAO abbreviations and numerical values of self-explanatory nature supplemented, if suitable approved abbreviations are not available, by the vocabulary of a national language, taken with its usual meaning in aviation.

7.2.3 Messages containing SIGMET information for subsonic aircraft shall be identified as “SIGMET”, those containing information for supersonic aircraft during transonic or supersonic flight shall be identified as “SIGMET SST”.

7.2.4 The sequence number referred to in 7.2.1 b) shall correspond with the number of SIGMET messages issued for the flight information region since 0001 GMT on the day concerned.

EXAMPLE OF SIGMET MESSAGE

YUDO SIGMET 5 VALID 1215/1600 — SEV CAT OBS AT 1210 YUDO FL350 — MOV E 20 KT WKN

Meaning: The fifth SIGMET message issued by the Donlon/International* meteorological watch office since 0001 GMT; the message is valid from 1215 GMT to 1600 GMT; severe clear air turbulence was observed at 1210 GMT over Donlon/International* at flight level 250; the turbulence is expected to move eastwards at 20 knots and to weaken in intensity.

* Fictitious location

7.2.5 Recommendation.— *The period of validity of a SIGMET message should be not more than 6 hours, and preferably not more than 4 hours. It should be indicated by the term “VALID” followed by the beginning and the end of that period in four figures each, separated by “/”; for example, a period of validity from 1215 GMT to 1600 GMT should be given as “VALID 1215/1600”. The period of validity should be understood to be that period during which the information is valid for transmission to aircraft in flight.*

7.2.6 Recommendation.— *A SIGMET message relating to the expected occurrence of a weather phenomenon should be issued not more than 6 hours, and preferably not more than 4 hours, before the expected time of occurrence of that phenomenon.*

7.2.7 Recommendation.— *SIGMET messages should be disseminated to meteorological watch offices and to other meteorological offices in accordance with regional air navigation agreement.*

7.3 Aerodrome warnings

7.3.1 Aerodrome warnings shall give concise information, in plain language, of meteorological conditions which could adversely affect aircraft on the ground, including parked aircraft, and the aerodrome facilities and services. The warnings shall be issued in accordance with local arrangements to operators, aerodrome services and to others concerned, by the meteorological office designated to provide service for that aerodrome.

7.3.2 Recommendation.— *Aerodrome warnings should relate to the occurrence or expected occurrence of one or more of the following phenomena:*

- tropical cyclone
- thunderstorm
- hail

- snow
- freezing precipitation
- hoar frost or rime
- sandstorm
- duststorm
- rising sand or dust
- strong surface wind and gusts
- squall
- frost

7.3.3 Recommendation.— *When quantitative criteria are necessary for the issue of aerodrome warnings covering, for example, the expected maximum wind speed or the expected total snow-fall, the criteria should be established by agreement between the meteorological office and the users of the warnings.*

7.4 Wind shear warnings

7.4.1 Recommendation.— *Wind shear warnings should give concise information of the observed or expected existence of wind shear which could adversely affect aircraft on the approach path or take-off path between runway level and 500 m (1 600 ft) above that level. The warnings should be prepared and disseminated in accordance with local arrangements with the appropriate ATS Authority and operators concerned and by the meteorological office designated to provide service for the aerodrome.*

Note 1.— *Where local topography has been shown to produce significant wind shears at heights in excess of 500 m (1 600 ft) above runway level then 500 m (1 600 ft) should not be considered restrictive.*

Note 2.— *Wind shear conditions are normally associated with one or more of the following phenomena:*

- thunderstorms
- cold or warm fronts

- strong surface winds coupled with local topography
- sea breeze fronts
- mountain waves
- low-level temperature inversions

7.4.2 Recommendation.— As wind shear along the approach and take-off paths, for the time being, cannot be satisfactorily observed from the ground, evidence of its existence should be derived from aircraft observations during the climb-out or approach phases of flight to be made in accordance with Chapter 5, 5.5.1. In addition, where practicable, evidence of the existence of wind shear should be derived from other meteorological information, for example, from appropriate sensors located on existing masts or towers in the vicinity of the aerodrome or nearby areas of higher ground, or from a system of surface wind and/or pressure sensors located around the perimeter of an aerodrome.

7.4.3 Recommendation.— Wind shear warnings should be prepared in abbreviated plain language. Wind shear in the approach area should be reported, for example, as “WS WRNG SURFACE WIND 320/10 WIND AT 60M 360/25 IN APCH”.

7.4.4 Recommendation.— When an aircraft report is used to prepare a wind shear warning, or to confirm a warning

previously issued, the corresponding aircraft report, including the aircraft type, should be given unchanged in the warning, for example, “WS WRNG B707 REPORTED MOD WS IN APCH RWY 34 AT 1510”.

Note 1.— Following reported encounters by both arriving and departing aircraft two different wind shear warnings may exist, one for arriving aircraft and one for departing aircraft.

Note 2.— Specifications for reporting the intensity of wind shear are still undergoing development. It is recognized, however, that pilots, when reporting wind shear, may use the qualifying terms “moderate”, “strong” or “severe”, based to a large extent on their subjective assessment of the intensity of the wind shear encountered. In accordance with 7.4.4, such reports are to be incorporated unchanged in wind shear warnings.

7.4.5 Recommendation.— Wind shear warnings for arriving aircraft and/or departing aircraft should be cancelled when aircraft reports indicate that wind shear no longer exists, or alternatively, after an agreed elapsed time. The criteria for the cancellation of a wind shear warning should be defined locally for each aerodrome, as agreed between the Meteorological Authority, the appropriate ATS Authority and the operators concerned.

CHAPTER 8. AERONAUTICAL CLIMATOLOGICAL INFORMATION

8.1 General provisions

8.1.1 Aeronautical climatological information required for the planning of flight operations shall be prepared in the form of aerodrome climatological tables, aerodrome climatological summaries and aeronautical descriptive climatological memoranda. Such information shall be supplied to aeronautical users as agreed between the Meteorological Authority and those users.

Note.— Climatological data required for aerodrome planning purposes are set out in Annex 14, Attachment A.

8.1.2 **Recommendation.**— Aeronautical climatological information should be based on observations made over a number of years and that period should be indicated in the information supplied.

8.1.3 **Recommendation.**— Aeronautical climatological information should be prepared in the forms and according to the procedures prescribed by the World Meteorological Organization.

8.1.4 **Recommendation.**— Aeronautical climatological information should be exchanged on request between Meteorological Authorities. Operators and other aeronautical users desiring such information should normally apply to the Meteorological Authority responsible for its preparation, or to the Meteorological Authority of the State of the operator or of the other aeronautical user.

8.2 Aerodrome climatological tables

8.2.1 **Recommendation.**— Each Contracting State should make arrangements for collecting and retaining the necessary observational data and have the capability:

- a) to prepare aerodrome climatological tables for each regular and alternate international aerodrome within its territory; and
- b) to make available such climatological tables to an aeronautical user within a time period as agreed between the Meteorological Authority and that user.

8.2.2 **Recommendation.**— An aerodrome climatological table should give as applicable:

- a) mean values and variations therefrom, including maximum and minimum values, of meteorological elements (for example, of air temperature); and/or

- b) the frequency of occurrence of present weather phenomena affecting flight operations at the aerodrome (for example, of sandstorms); and/or

- c) the frequency of occurrence of specified values of one, or of a combination of two or more, elements (for example, of a combination of low visibility and low cloud).

8.2.3 **Recommendation.**— Aerodrome climatological tables should give at least information on surface wind, visibility/runway visual range, cloud height and amount, temperature and pressure.

8.3 Aerodrome climatological summaries

8.3.1 **Recommendation.**— Each Contracting State should prepare and publish, or otherwise make available, aerodrome climatological summaries for each regular and alternate international aerodrome within its territory.

8.3.2 **Recommendation.**— An aerodrome climatological summary should give information on surface wind, visibility/runway visual range, cloud amount and height, temperature and pressure and, where aerodrome climatological tables are prepared, the summary should be based on the same observational data.

8.4 Aeronautical descriptive climatological memoranda

8.4.1 **Recommendation.**— Each Contracting State should prepare and publish, or otherwise make available, aeronautical descriptive climatological memoranda for its territory. By agreement between the Meteorological Authorities concerned, the memoranda may also be produced collectively for the territories of several Contracting States.

8.4.2 **Recommendation.**— Similar memoranda should be prepared and published, or otherwise made available, for specific areas or portions of air routes over international waters, either individually by the Contracting State providing air traffic services within the flight information region, or collectively by agreement amongst the Contracting States concerned.

8.4.3 **Recommendation.**— An aeronautical descriptive climatological memorandum should give at least information on upper winds, upper-air temperatures and significant en-route weather phenomena.

**8.5 Copies of meteorological
observational data**

8.5.1 Recommendation.— *Each Meteorological Authority, on request and to the extent practicable, should make*

available to any other Meteorological Authority, to operators and to others concerned with the application of meteorology to international air navigation, copies of original meteorological observational data required for research, investigation or operational analysis.

CHAPTER 9. SERVICE FOR OPERATORS AND FLIGHT CREW MEMBERS

9.1 General provisions

9.1.1 Meteorological information shall be supplied to operators and flight crew members for:

- a) pre-flight planning by operators;
- b) use by flight crew members before departure;
- c) aircraft in flight.

9.1.2 Meteorological information supplied to operators and flight crew members shall cover the flight in respect of time, altitude and geographical extent. Accordingly, the information shall relate to appropriate fixed times, or periods of time, and shall extend to that aerodrome of intended landing at which new information is to be supplied. On request, or whenever conditions impose doubt as to the practicability of landing at that aerodrome, additional information shall be included, covering the meteorological conditions expected between the aerodrome of intended landing and one alternate aerodrome designated by the operator. In addition, if agreed between the Meteorological Authority and the operator, information up to a further aerodrome may be supplied.

9.1.3 Meteorological information supplied to operators and flight crew members shall include upper winds and upper-air temperatures, significant en-route weather phenomena, meteorological reports, aerodrome forecasts, forecasts for take-off, landing forecasts, SIGMET information and air-reports, which are available at the meteorological office and which are relevant to the planned flight operations.

9.1.4 Meteorological information supplied to operators and flight crew members shall include forecasts for the aerodrome of departure and for the aerodrome of intended landing. On request, forecasts shall also be supplied for one or more suitable alternate aerodromes as required by the operator to complete the operational flight plan.

9.1.5 **Recommendation.**— *Aerodrome forecasts additional to those referred to in 9.1.4 which may be required by an operator should be supplied, if available, by agreement between the Meteorological Authority and the operator.*

9.1.6 **Recommendation.**— *Meteorological information supplied to operators and flight crew members should include aerodrome reports for the aerodrome of departure, the aerodrome of intended landing and alternate aerodromes located within 2 hours' flying time of the aerodrome of departure, but*

with possible exceptions for certain routes and operations as determined by regional air navigation agreement. Additional relevant reports should be supplied if available.

9.1.7 **Recommendation.**— *On request by the operator, the meteorological information supplied for flight planning should include data for the determination of the lowest usable flight level.*

9.1.8 Where necessary, the Meteorological Authority of the State providing service for operators and flight crew members shall initiate co-ordinating action with the Meteorological Authorities of other States with a view to obtaining from them the reports and/or forecasts required.

9.1.9 Meteorological information shall be supplied to operators and flight crew members by one or more of the following, as agreed between the Meteorological Authority and operator concerned, and with the order shown below not implying priorities:

- a) written or printed material, including specified charts and forms;
- b) grid point data in digital form;
- c) briefing;
- d) consultation;
- e) display.

9.1.10 The Meteorological Authority, in consultation with the operator, shall determine:

- a) the type and format of meteorological information to be supplied;
- b) methods and means of supplying that information.

9.1.11 Meteorological information shall be supplied to operators and flight crew members at the location to be determined by the Meteorological Authority, after consultation with the operators and at the time to be agreed upon between the meteorological office and the operator concerned. The service shall normally be confined to flights originating within the territory of the State concerned, unless otherwise agreed between the Meteorological Authority and the operator concerned. At an aerodrome without a meteorological office, arrangements for the supply of meteorological information shall be as agreed upon between the Meteorological Authority and the operator concerned.

9.2 Information for pre-flight planning by operators

9.2.1 Meteorological information for pre-flight planning by operators shall include any or all of the following information, as required:

- a) current and forecast upper winds, upper-air temperatures, tropopause heights and maximum wind information;
- b) existing and expected significant en-route weather phenomena and jetstream information;
- c) a forecast for take-off;
- d) aerodrome reports and aerodrome forecasts.

9.2.2 **Recommendation.**— *Meteorological information for pre-flight planning by operators for supersonic aircraft should include data covering the levels used for transonic and supersonic flight, together with the levels that may be used for subsonic flight. Particular mention should be made of occurrence and expected occurrence, location and vertical extent of cumulonimbus clouds, turbulence and precipitation.*

9.2.3 When upper-air information is supplied in chart form, it shall consist of charts for standard isobaric surfaces and/or other types of upper-air charts as applicable.

9.2.4 **Recommendation.**— *The upper wind and upper-air temperature information and the significant en-route weather information requested for pre-flight planning by the operator should normally be supplied as soon as it becomes available, but not later than 3 hours before departure. Other meteorological information requested for pre-flight planning by the operator should normally be supplied as soon as is practicable.*

9.2.5 **Recommendation.**— *Whenever it becomes apparent that the meteorological information to be included in the flight documentation will differ materially from that made available for pre-flight planning, the operator should be advised immediately and, if practicable, be supplied with the revised information.*

9.3 Briefing, consultation and display

9.3.1 Briefing and/or consultation shall be provided, on request, to flight crew members and/or other flight operations personnel. Its purpose shall be to supply the latest available information on existing and expected meteorological conditions along the route to be flown, at the aerodrome of intended landing, alternate aerodromes and other aerodromes as relevant, either to explain and amplify the information contained in the flight documentation or, if so agreed between the Meteorological Authority and the operator, in lieu of flight documentation.

9.3.2 Meteorological information used for briefing and consultation shall include any or all of the following, as required:

- a) current and forecast upper winds, upper-air temperatures, tropopause heights and maximum wind information;
- b) existing and expected significant en-route weather phenomena and jetstream information;
- c) a forecast for take-off;
- d) aerodrome reports and aerodrome forecasts.

9.3.3 **Recommendation.**— *Briefing and/or consultation for flight crew members of supersonic aircraft should include meteorological information covering the flight levels of transonic and supersonic flight. Particular mention should be made of occurrence and expected occurrence, location and vertical extent of cumulonimbus clouds, turbulence and precipitation.*

9.3.4 **Recommendation.**— *Briefing and/or consultation for low-level flights, including those in accordance with the visual flight rules, should include meteorological information covering altitudes up to flight level 100. Particular mention should be made of the occurrence or expected occurrence of precipitation, fog and other phenomena causing widespread reduction of visibility to less than 10 km, as well as the occurrence or expected occurrence of clouds which may affect the flight.*

9.3.5 If the meteorological office expresses an opinion on the development of the meteorological conditions at an aerodrome which differs appreciably from the aerodrome forecast included in the flight documentation, the attention of flight crew members shall be drawn to the divergence. The portion of the briefing dealing with the divergence shall be recorded at the time of briefing and this record shall be made available to the operator.

9.3.6 The required briefing, consultation, display and/or flight documentation shall normally be provided by the meteorological office associated with the aerodrome of departure. At an aerodrome where these services are not available, arrangements to meet the requirements of flight crew members shall be as agreed upon between the Meteorological Authority and the operator concerned. In exceptional circumstances, such as an undue delay, the meteorological office associated with the aerodrome shall provide or, if that is not practicable, arrange for the provision of a new briefing, consultation and/or flight documentation as necessary.

9.3.7 **Recommendation.**— *The flight crew member or other flight operations personnel for whom briefing, consultation and/or flight documentation has been requested should visit the meteorological office at the time agreed upon between*

the meteorological office and the operator concerned. Where local circumstances at an aerodrome make personal briefing or consultation impracticable, the meteorological office should provide those services by telephone or other suitable telecommunications facilities.

9.3.8 To assist the flight crew members and others concerned with the preparation of the flight and for use in briefing and consultation, the meteorological office shall display the latest available:

- a) routine and selected special reports;
- b) aerodrome and landing forecasts;
- c) aerodrome warnings relating to the local aerodrome;
- d) forecasts for take-off;
- e) air-reports, including pictorial cross-sections contained in completed AIREP forms;
- f) SIGMET information;
- g) current and prognostic charts;
- h) meteorological satellite photographs or mosaics and/or nephanalyses;
- i) ground-based weather radar information.

9.3.9 **Recommendation.**— *The material displayed should be readily accessible to the flight crew members or other flight operations personnel concerned. By agreement between the Meteorological Authority and the user, the display may be used in lieu of briefing and/or consultation.*

9.4 Flight documentation — general

9.4.1 **Recommendation.**— *Flight documentation should comprise information on:*

- a) upper winds and upper-air temperatures;
- b) expected significant en-route weather phenomena and, if relevant, tropopause heights and jetstreams;
- c) aerodrome forecasts.

9.4.2 **Recommendation.**— *Meteorological offices should, as far as practicable, provide information received within the framework of the world area forecast system for flight documentation. The flight documentation should be presented in the form of charts, tabular forms, or abbreviated plain-language texts. Aerodrome forecasts should be presented in the TAF code, or in abbreviated plain-language text using a tabular presentation.*

Note.— *Models of charts and forms for use in the preparation of flight documentation are given in the Appendix. These models and methods for their completion are developed by the World Meteorological Organization on the basis of relevant operational requirements stated by the International Civil Aviation Organization.*

9.4.3 **Recommendation.**— *Charts included in flight documentation should have the following physical characteristics:*

- a) *for convenience, the largest size of charts should be about 42 × 30 cm (standard size A3) and the smallest size should be about 21 × 30 cm (standard size A4). The choice between these sizes should depend on the route lengths and the amount of detail that needs to be given in the charts as agreed between Meteorological Authorities and users;*
- b) *major geographical features, such as coastlines, major rivers and lakes should be depicted in a way that makes them easily recognizable;*
- c) *for charts prepared by computer, meteorological data should take preference over basic chart information, the former cancelling the latter wherever they overlap;*
- d) *major aerodromes should be shown and identified by their ICAO location indicators;*
- e) *a geographical grid should be shown with meridians and parallels represented by dotted lines at each 10° latitude and longitude; dots should be spaced one degree apart;*
- f) *latitude and longitude values should be indicated at various points throughout the charts (i.e. not only at the edges);*
- g) *labels on the charts should be clear and simple and should present the name of the regional area forecast centre, the type of chart, date and valid time and if necessary the types of units used in an unambiguous way.*

9.4.4 **Recommendation.**— *Meteorological information included in flight documentation should be represented as follows:*

- a) *winds on charts should be depicted by arrows with feathers and shaded pennants on a sufficiently dense grid;*
- b) *temperatures should be depicted by figures in circles on a sufficiently dense grid;*
- c) *grid points should coincide with the relevant grid points in the digital data received from a world area forecast centre; and*

- d) wind arrows should take precedence over temperatures and either should take precedence over chart background.

9.4.5 Recommendation.— *For short-haul flights charts should be prepared covering limited areas at a scale of $1:15 \times 10^6$ as required and subject to regional air navigation agreement.*

9.4.6 Recommendation.— *The minimum number of charts for flights between flight level 250 and flight level 450 should include a high-level significant weather chart (flight level 250 to flight level 450) and a forecast 250 mb wind and temperature chart. The actual charts provided for pre-flight and in-flight planning and for flight documentation should be as agreed between Meteorological Authorities and other users and the appropriate regional area forecast centre(s) concerned within a service area.*

9.4.7 Recommendation.— *The set of charts to be provided under the area forecast system for flights below flight level 250 and for flights above flight level 450 including supersonic flights should be as agreed between user States and other users and the regional area forecast centre concerned within a service area.*

9.4.8 Recommendation.— *Flight documentation should normally be supplied as shortly before departure as is practicable.*

9.4.9 Recommendation.— *Whenever necessary and possible, the flight documentation should be brought up to date, in writing or orally, before it is supplied to flight crew members. In cases where a need for amendment arises after the flight documentation has been supplied, and before take-off of the aircraft, the meteorological office should, as agreed locally, issue the necessary amendment or up-dated information to the operator or to the local air traffic services unit, for transmission to the aircraft.*

9.4.10 Recommendation.— *In flight documentation height indications should be given as follows:*

- a) *all references to en-route meteorological conditions, such as height indications of upper winds, turbulence or bases and tops of clouds, should preferably be expressed in flight levels; they may also be expressed in pressure-altitude, pressure, altitude or, for low-level flights, height above ground level;*
- b) *all references to aerodrome meteorological conditions, such as height indications of the bases of clouds, should be expressed in height above the aerodrome elevation.*

9.4.11 Recommendation.— *The forms and charts included in flight documentation should be printed in English, French, Russian or Spanish; they should, wherever practicable, be completed in the language requested by the operator,*

preferably using one of those languages. Where appropriate, approved abbreviations should be used. The units employed for each element should be indicated; they should normally be those employed by the Meteorological Authority concerned.

9.4.12 The Meteorological Authority shall retain a copy of the written or printed flight documentation, including charts and specified forms, supplied to flight crew members, for a period of at least 30 days from the date of issue. This information shall be made available, on request, for inquiries or investigations and, for these purposes, shall be retained until the inquiry or investigation is completed.

9.5 Flight documentation — upper wind and upper-air temperature information

9.5.1 Where upper wind and upper-air temperature information is supplied in chart form to flight crew members before departure, the charts shall be fixed time prognostic charts for standard isobaric surfaces. In tropical areas, or for short flights, current charts may be provided in lieu of prognostic charts; in such cases, the levels depicted shall correspond to the standard isobaric levels.

9.5.2 Recommendation.— *Where upper wind and upper-air temperature information is supplied in tabular form, it should include data for the same flight levels as for upper-air charts. This information should be given for spot locations on a regular grid.*

Note.— *Examples of the form of presentation of tabular forecasts of upper winds and upper-air temperatures are given in Section 2 of the Appendix.*

9.6 Flight documentation — significant weather charts

9.6.1 Where information on significant en-route weather phenomena is supplied in chart form to flight crew members before departure, the charts shall be significant weather charts valid for a specified fixed time. Such charts shall show, as appropriate to the flight:

- a) active thunderstorms;
- b) tropical cyclone;
- c) severe line squalls;
- d) moderate or severe turbulence (in cloud or clear air);
- e) moderate or severe icing;
- f) hail;
- g) widespread sandstorm/duststorm;

- h) for flight level 100 to flight level 250, clouds associated with a) to g) above;
- i) above flight level 250, cumulonimbus cloud associated with a) to g) above;
- j) surface position of well-defined convergence zones;
- k) surface positions, speed and direction of movement of frontal systems;
- l) freezing level, for flight level 100 to flight level 250;
- m) tropopause heights;
- n) jetstreams.

Note 1.— For aircraft operating above flight level 250, items a) to g) are only required if expected to be above that level.

Note 2.— The abbreviation “CB” should only be included where it refers to the occurrence or expected occurrence of an area of widespread cumulonimbus clouds or cumulonimbus along a line with little or no space between individual clouds, or to cumulonimbus embedded in cloud layers or concealed by haze. It does not refer to isolated or scattered cumulonimbus not embedded in cloud layers or concealed by haze.

Note 3.— Frontal systems should be included only when associated with significant en-route weather phenomena.

9.6.2 Recommendation.— *On significant weather charts, the inclusion of “CB” or the thunderstorm symbol should be understood to include all weather phenomena normally associated with cumulonimbus or thunderstorm, namely, moderate or severe icing, moderate or severe turbulence and hail.*

9.6.3 Recommendation.— *Significant weather charts for low-level flights, including those in accordance with the visual flight rules, operating up to flight level 100 should show, as appropriate to the flight:*

- a) fronts and convergence zones and their expected movement;
- b) areas and levels affected by thunderstorm, tropical cyclone, line squall, hail, moderate or severe turbulence in cloud or in clear air, mountain waves and associated downdrafts, aircraft icing, freezing precipitation, widespread sandstorm or duststorm, fog, precipitation and other phenomena causing widespread reduction of visibility to less than 10 km;
- c) cloud amount, type and height indications of bases and tops;

- d) surface visibility, if less than 10 km;
- e) pressure centres and their expected movement;
- f) height indication of 0°C level(s) if lower than the top of the airspace for which the forecast is provided.

Note.— Examples of the form of presentation of significant weather charts are given in Section 3 of the Appendix.

9.7 Flight documentation — aerodrome forecasts

9.7.1 The flight documentation shall in all cases include the aerodrome forecasts for the aerodrome of departure, and for the aerodrome of intended landing. In addition, the flight documentation shall include aerodrome forecasts for one or more suitable alternate aerodromes, as needed to complete the operational flight plan and as selected by agreement between the Meteorological Authority and the operators, and taken from the list of aerodromes contained in the relevant Regional Air Navigation Plan.

9.7.2 Recommendation.— *By agreement between the Meteorological Authority and the operator the flight documentation should include forecasts for a limited number of alternate aerodromes en route and of aerodromes where intermediate stops are planned. In such cases use should be made of available forecasts for regular aerodromes.*

9.7.3 Aerodrome forecasts received from other meteorological offices shall be included in flight documentation without change in substance.

9.7.4 Recommendation.— *When an aerodrome forecast is not received in time, the meteorological office associated with the aerodrome of departure should make all practicable efforts to obtain the forecast but, if unobtainable, the office should, if possible, prepare a provisional forecast. The meteorological office should inform the flight crew member that the forecast is provisional and record its origin in the flight documentation.*

9.7.5 Recommendation.— *Aerodrome forecasts should be presented in the TAF code form; they may also be presented in tabular form or in the form of an abbreviated plain-language text. Where presentation in the TAF code form is used, the location indicators and the abbreviations used should be explained in the flight documentation. If several aerodrome forecasts are included in the TAF code form, they should be presented in a manner which permits the ready identification of the beginning and end of each forecast.*

Note.— Examples of the form of presentation of aerodrome forecasts are given in Section 4 of the Appendix.

9.8 Flight documentation — supplementary charts and other forms of presentation

9.8.1 Recommendation.— *Where flight documentation covering the significant en-route weather conditions is not supplied in chart form, it should be presented in tabular form and/or as an abbreviated plain-language text.*

Note.— *Examples of the form of presentation of tabular forecasts are given in the Appendix.*

9.8.2 Recommendation.— *Where flight documentation is supplied in the form of an abbreviated plain-language text, it should cover the whole route to be flown. If such documentation covers more than one route, it should permit ready identification by the user of the information relevant to the route to be flown.*

9.8.3 Recommendation.— *Flight documentation for low-level flights, including those in accordance with the visual flight rules, should contain the following information as appropriate to the flight and, where the forecasts are issued in the form of an abbreviated plain-language text, in the order indicated:*

- a) pressure centres, fronts and convergence zones and their expected movements and developments;*
- b) significant weather phenomena as specified in 9.6.3 b);*
- c) cloud amount, type and height indications of bases and tops;*
- d) surface visibility, if less than 10 km;*
- e) pressure values for altimeter setting, if required;*
- f) height indication of 0°C level(s), if lower than the top of the airspace for which the forecast is supplied;*
- g) upper winds and upper-air temperatures for points separated by no more than 500 km (300 NM) and for altitude intervals not exceeding 1 500 m (5 000 ft) up to flight level 100. If available, upper winds and upper-air temperatures should be supplied for altitude intervals not exceeding 900 m (3 000 ft);*
- h) if necessary, a brief general indication (outlook) concerning changes which are expected to occur after the end of the forecast period.*

9.9 Information for aircraft in flight

9.9.1 Meteorological information for use by aircraft in flight shall be supplied by a meteorological office to its associated air traffic services unit and through VOLMET broadcasts. Meteorological information for planning by the operator for aircraft in flight shall be supplied on request, as agreed between the Meteorological Authority or Authorities and the operator concerned.

9.9.2 Meteorological information for use by aircraft in flight shall be supplied to air traffic services units in accordance with the specifications of Chapter 10.

9.9.3 Recommendation.— *Meteorological information should be supplied through VOLMET broadcasts as determined by regional air navigation agreement, and in accordance with the specifications of Chapter 11.*

9.9.4 Recommendation.— *If, in exceptional circumstances, an aircraft in flight requests meteorological information, the meteorological office which receives the request should arrange to supply the information with the assistance, if necessary, of another meteorological office.*

9.9.5 Recommendation.— *For supersonic aircraft in flight the meteorological office serving the aerodrome of intended landing should, on request by the operator, supply a forecast covering the transonic deceleration and subsonic descent phases. This forecast should be transmitted to the area control centre or flight information centre concerned within the two hours before arrival. The operator should advise the meteorological office, in good time, of the location of the descent path and of the time at which the aircraft is expected to commence the descent.*

9.9.6 Recommendation.— *Meteorological information for planning by the operator for aircraft in flight should be supplied during the period of the flight and should normally consist of any or all of the following:*

- a) routine and special reports, aerodrome forecasts and landing forecasts;*
- b) SIGMET information and special air-reports relevant to the flight, unless the latter have been the subject of a SIGMET message;*
- c) upper wind and upper-air temperature information.*

CHAPTER 10. INFORMATION FOR AIR TRAFFIC SERVICES AND FOR SEARCH AND RESCUE SERVICES

10.1 Information for air traffic services units

10.1.1 The Meteorological Authority shall designate a meteorological office to be associated with each air traffic services unit. The associated meteorological office shall, after co-ordination with the air traffic services unit, supply, or arrange for the supply of up-to-date meteorological information to the unit as necessary for the conduct of its functions.

10.1.2 **Recommendation.**— *The associated meteorological office for an aerodrome control tower or approach control office should be an aerodrome meteorological office.*

10.1.3 The associated meteorological office for a flight information centre or an area control centre shall be a meteorological watch office.

10.1.4 **Recommendation.**— *Where, owing to local circumstances, it is convenient for the duties of an associated meteorological office to be shared between two or more meteorological offices, the division of responsibility should be determined by the Meteorological Authority in consultation with the appropriate ATS Authority.*

10.1.5 The following meteorological information shall be supplied, as necessary, to an aerodrome control tower by its associated aerodrome meteorological office:

- a) routine, special and selected special reports, including current pressure data, aerodrome and landing forecasts and amendments thereto, for the aerodrome concerned;
- b) SIGMET information and aerodrome warnings;
- c) any additional meteorological information agreed upon locally, such as reports for take-off or forecasts of surface wind for the determination of possible runway changes.

10.1.6 The following meteorological information shall be supplied, as necessary, to an approach control office by its associated aerodrome meteorological office:

- a) routine, special and selected special reports, including current pressure data, aerodrome and landing forecasts and amendments thereto for the aerodrome(s) with which the approach control office is concerned;
- b) SIGMET information and appropriate special air-reports for the airspace with which the approach control office is concerned and aerodrome warnings;

- c) any additional meteorological information agreed upon locally, such as reports for landing.

10.1.7 The following meteorological information shall be supplied, as necessary, to a flight information centre or an area control centre by its associated meteorological watch office:

- a) routine reports and selected special reports, including current pressure data for aerodromes and other locations, aerodrome forecasts and landing forecasts and amendments thereto, covering the flight information region or the control area and, if required by the flight information centre or area control centre, covering aerodromes in neighbouring flight information regions, as determined by regional air navigation agreement;
- b) forecasts of upper winds, upper-air temperatures and significant en-route weather phenomena and amendments thereto, SIGMET information and appropriate special air-reports for the flight information region or control area and, if determined by regional air navigation agreement and required by the flight information centre or area control centre, for neighbouring flight information regions;
- c) any other meteorological information required by the flight information centre or area control centre to meet requests from aircraft in flight; if the information requested is not available in the associated meteorological watch office, that office shall request the assistance of another meteorological office in supplying it.

10.1.8 Any meteorological information requested by an air traffic services unit in connexion with an aircraft emergency shall be supplied as rapidly as possible.

10.1.9 **Recommendation.**— *The information supplied to flight information centres and area control centres for supersonic aircraft should cover the levels used for transonic and supersonic flight and should include forecasts for subsonic descent paths to aerodromes in the flight information region.*

10.1.10 Where necessary for flight information purposes, current meteorological reports and forecasts shall be supplied to designated aeronautical telecommunication stations. A copy of such information shall be forwarded, if required, to the flight information centre or the area control centre.

10.1.11 Recommendation.— *Routine, special and selected special reports, aerodrome and landing forecasts, SIGMET information, upper wind and upper-air temperature forecasts and amendments thereto should be supplied to air traffic services units in the form in which they are prepared, disseminated to other meteorological offices or received from other meteorological offices, unless otherwise agreed locally.*

10.1.12 Recommendation.— *When computer-processed upper-air data for grid points are made available to air traffic services units in digital form for use by air traffic services computers, the contents, format and transmission arrangements should be as agreed between the Meteorological Authority and the appropriate ATS Authority. Where the data are supplied in a code form prescribed by the World Meteorological Organization, use should be made of the GRID code form employing the option provided therein for upper-air forecast data for aeronautical purposes. The data should normally be supplied as soon as is practicable after the processing of the forecasts has been completed.*

Note.— *The GRID code form is contained in WMO Publication No. 306, Manual on Codes, Volume I.*

10.2 Information for search and rescue services units

10.2.1 Meteorological offices designated by the Meteorological Authority in accordance with regional air navigation agreement shall supply search and rescue services units with the meteorological information they require in a form established by mutual agreement. For that purpose, the designated meteorological office shall maintain liaison with the search and rescue services unit throughout a search and rescue operation.

10.2.2 Information to be supplied to rescue co-ordination centres shall include the meteorological conditions that existed in the last known position of a missing aircraft and along the intended route of that aircraft with particular reference to:

- a) significant en-route weather phenomena;
- b) cloud amount and type, particularly cumulonimbus; height indications of bases and tops;
- c) visibility and phenomena reducing visibility;
- d) surface wind and upper wind;
- e) state of ground, in particular, any snow cover or flooding;
- f) state of the sea and swell, if relevant to the search area;
- g) sea level pressure data.

10.2.3 Recommendation.— *On request from the rescue co-ordination centre, the designated meteorological office should arrange to obtain details of the flight documentation which was supplied to the missing aircraft, together with any amendments to the forecast which were transmitted to the aircraft in flight.*

10.2.4 Recommendation.— *To facilitate search and rescue operations the designated meteorological office should, on request, supply:*

- a) *complete and detailed information on the current and forecast meteorological conditions in the search area;*
- b) *current and forecast conditions en route, covering flights by search aircraft from and returning to the aerodrome from which the search is being conducted.*

10.2.5 Recommendation.— *On request from the rescue co-ordination centre the designated meteorological office should supply, or arrange for the supply of meteorological information required by ships undertaking search and rescue operations.*

CHAPTER 11. REQUIREMENTS FOR AND USE OF COMMUNICATIONS

Note.— It is recognized that it is for each Contracting State to decide upon its own internal organization and responsibility for implementing the communications facilities referred to in this Chapter.

11.1 Requirements for communications

11.1.1 Suitable telecommunications facilities shall be made available to permit aerodrome meteorological offices and, as necessary, aeronautical meteorological stations to supply the required meteorological information to air traffic services units on the aerodromes for which those offices and stations are responsible, and in particular to aerodrome control towers, approach control offices and the aeronautical telecommunications stations serving these aerodromes.

11.1.2 Suitable telecommunications facilities shall be made available to permit meteorological watch offices to supply the required meteorological information to air traffic services and search and rescue services units in respect of the flight information regions, control areas and search and rescue regions for which those offices are responsible, and in particular to flight information centres, area control centres and rescue co-ordination centres and the associated aeronautical telecommunications stations.

11.1.3 Telecommunications facilities between meteorological offices and, as necessary, aeronautical meteorological stations and aerodrome control towers or approach control offices shall permit communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds.

11.1.4 **Recommendation.**— *Telecommunications facilities between meteorological offices and flight information centres, area control centres, rescue co-ordination centres and aeronautical telecommunications stations should permit:*

- a) communications by direct speech, the speed with which the communications can be established being such that the required points may normally be contacted within approximately 15 seconds; and*
- b) printed communications, when a record is required by the recipients; the message transit time should not exceed 5 minutes.*

Note.— In 11.1.3 and 11.1.4 “approximately 15 seconds” refers to telephony communications involving switchboard

operation and “5 minutes” refers to printed communications involving retransmission.

11.1.5 **Recommendation.**— *The telecommunications facilities required in accordance with 11.1.3 and 11.1.4 should be supplemented, as and where necessary, by other forms of visual or audio communications, for example, closed-circuit television or separate information processing systems.*

11.1.6 **Recommendation.**— *As agreed between the Meteorological Authority and operators, provision should be made to enable operators to establish suitable telecommunications facilities for obtaining meteorological information from aerodrome meteorological offices or other appropriate sources.*

11.1.7 Suitable telecommunications facilities shall be made available to permit meteorological offices to exchange operational meteorological information with other meteorological offices.

11.1.8 **Recommendation.**— *The telecommunication facilities used for the exchange of operational meteorological information presented in the form of messages or in digital form should be the aeronautical fixed telecommunication network. The use of other AFS circuits should be determined by regional air navigation agreement.*

11.1.9 **Recommendation.**— *Unless otherwise determined by regional air navigation agreement, AFTN messages containing operational meteorological information should achieve transit times of less than the following:*

<i>SIGMET messages and special air-reports.....</i>	<i>5 minutes</i>
<i>Amended aerodrome forecasts and corrections to aerodrome forecasts</i>	<i>5 minutes</i>
<i>Aerodrome reports with, where required, trend-type landing forecasts</i>	<div style="display: inline-block; vertical-align: middle; font-size: 3em; line-height: 1;">}</div> <div style="display: inline-block; vertical-align: middle;"> <i>0-900 km (500 NM).... 5 minutes</i> <i>more than 900 km (500 NM).... 10 minutes</i> </div>
<i>Aerodrome forecasts</i>	
<i>Selected special reports</i>	

11.1.10 **Recommendation.**— *When upper-air data for grid points in digital form are made available for use by air traffic services computers, the transmission arrangements should be as agreed between the Meteorological Authority and the appropriate ATS Authority.*

11.1.11 Recommendation.— *When upper-air data for grid points in digital form are made available to operators for flight planning by computer, the transmission arrangements should be as agreed among the regional area forecast centre, the Meteorological Authority and the operators.*

11.2 Use of aeronautical fixed service communications

11.2.1 Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service shall be originated by the appropriate meteorological office or aeronautical meteorological station.

Note.— *Meteorological bulletins containing operational meteorological information authorized for transmission via the aeronautical fixed service are listed in Annex 10, Volume II, Chapter 4, together with the relevant priorities and priority indicators.*

11.2.2 Recommendation.— *Whenever possible, exchanges of operational meteorological information should be made in consolidated bulletins of the same types of meteorological information.*

11.2.3 Recommendation.— *Meteorological bulletins required for scheduled transmissions should be filed regularly and at the prescribed scheduled times. Aerodrome reports should be filed for transmission not later than 5 minutes after the actual time of observation. Aerodrome forecasts should be filed for transmission at least one hour before the commencement of their period of validity, unless otherwise determined by regional air navigation agreement.*

11.2.4 Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed service facilities shall contain a heading consisting of:

- a) an identifier of four letters and, if required, one or two figures;
- b) the ICAO four-letter location indicator corresponding to the geographical location of the meteorological office originating or compiling the meteorological bulletin;
- c) a date-time group;
- d) if required, a three-letter indicator.

Note 1.— *Detailed specifications on format and contents of the heading are given in the WMO Manual on the Global Telecommunications System, Volume I.*

Note 2.— *ICAO location indicators are listed in ICAO Doc 7910 — Location Indicators.*

11.2.5 The identifier shall consist of four letters and, if required, two figures:

- a) first and second letters: data designator;
- b) third and fourth letters: geographical designator;
- c) one or two figures; used to differentiate two or more meteorological bulletins which contain data in the same code and which originate from the same geographical area and have the same originating centre.

Note.— *Data designators and geographical designators for meteorological bulletins containing operational meteorological information are listed in the Manual of Aeronautical Meteorological Practice (Doc 8896-AN/893).*

11.2.6 The date-time group shall consist of six figures with the first two figures indicating the day of the month and the following four figures indicating:

- a) for routine and selected special reports, the time of observation in GMT;
- b) for aerodrome, route and area forecasts, the full hour in GMT (the last two digits shall be 00) preceding the transmission time; for other forecasts and for analyses, the standard time of observation in GMT on which the forecast or analysis is based;
- c) for other meteorological bulletins, such as SIGMET information, the time of origin in GMT of the text of the bulletin.

11.2.7 The three-letter indicator shall identify delayed, corrected and amended meteorological bulletins and shall use the following abbreviations:

RTD — delayed bulletins
COR — corrected bulletins
AMD — amended bulletins

For these bulletins, the remainder of the heading shall be that of the original bulletin.

11.2.8 Meteorological bulletins containing operational meteorological information to be transmitted via the aeronautical fixed telecommunication network (AFTN) shall be encapsulated in the text part of the AFTN message format.

11.3 Use of aeronautical mobile service communications

11.3.1 The contents and format of reports, forecasts and SIGMET information transmitted to aircraft shall be consistent with the provisions of Chapters 4, 6 and 7 of this Annex.

11.3.2 Recommendation.— *The contents and format of air-reports transmitted by aircraft should be consistent with the provisions of Chapter 5 of this Annex and of the Procedures for Air Navigation Services — Rules of the Air and Air Traffic Services (Doc 4444-RAC/501), Appendix 1.*

11.3.3 The substance of a meteorological bulletin transmitted via the aeronautical mobile service shall remain unchanged from that contained in the bulletin as originated.

11.4 Use of aeronautical broadcasting service — contents of VOLMET broadcasts

11.4.1 Continuous VOLMET broadcasts, normally on very high frequencies (VHF), shall contain current aerodrome weather reports, with trend parts where available.

11.4.2 Scheduled VOLMET broadcasts, normally on high frequencies (HF), shall contain current aerodrome reports, with trend parts where available, and aerodrome forecasts.

11.4.3 Recommendation.— *The aerodromes for which reports and forecasts are to be included in VOLMET broadcasts, the sequence in which they are to be transmitted and the broadcast time should be determined by regional air navigation agreement.*

11.4.4 Recommendation.— *When a report has not arrived from an aerodrome in time for a broadcast, the latest available report should be included in the broadcast, together with the time of observation.*

11.4.5 Recommendation.— *Aerodrome forecasts included in scheduled VOLMET broadcasts should have a*

period of validity of 9 hours; they should be issued every 3 hours and should, between these routine issues, be amended as necessary, to ensure that a forecast, when transmitted, reflects the latest opinion of the meteorological office concerned.

11.4.6 Recommendation.— *SIGMET messages should be included in scheduled VOLMET broadcasts if determined by regional air navigation agreement. Where this is done, the SIGMET message or an indication of “NIL SIGMET” should be transmitted at the beginning of the broadcast or of a five-minute time block.*

11.4.7 Recommendation.— *The contents and format of reports, forecasts and SIGMET information included in VOLMET broadcasts should be consistent with the provisions of Chapters 4, 6 and 7 of this Annex, as applicable to bulletins disseminated beyond the aerodrome of origin.*

11.5 Dissemination of area forecasts

11.5.1 Recommendation.— *Where regional area forecast centres issue their forecasts in the form of charts, the facsimile facilities used for their transmission should be such as to permit reception in States located within the geographical area determined by regional air navigation agreement.*

11.5.2 Recommendation.— *The quality of the charts received should be such as to permit reproduction in a sufficiently legible form for flight planning and documentation. Charts received should be legible over 95 per cent of their area.*

11.5.3 Recommendation.— *Transmissions should be such as to ensure that their interruption should not exceed ten minutes during any period of 6 hours.*

APPENDIX. FLIGHT DOCUMENTATION — MODEL CHARTS AND FORMS*

(See 9.4 to 9.8 of this Annex)

Section 1.—Upper wind and upper-air temperature charts

Model IS — Chart for standard isobaric surface

Section 2.—Tabular forecasts of upper winds and upper-air temperatures

Model TB — Tabular forecast of upper winds and upper-air temperatures

Section 3.—Significant weather charts

Model SWH — Significant weather chart (high level, FL 250 to FL 450)

Model SWM — Significant weather chart (medium level, FL 100 to FL 250)

Model SWL — Significant weather chart (low level, below FL 100)

Section 4.—Aerodrome forecasts

Model A1 — Aerodrome forecasts (tabular form)

Model A2 — Aerodrome forecasts (TAF code form)

Section 5.—Tabular forecasts

Model TA — Tabular forecast of en-route conditions

Section 6.—Explanation of notations used in flight documentation

Model SN — Sheet of notations used in flight documentation

* Model charts and forms are being developed by the World Meteorological Organization and will be included in a future amendment when adopted by the Council.

ATTACHMENTS TO ANNEX 3

ATTACHMENT A. GUIDANCE ON THE PROCEDURES TO BE FOLLOWED BY A WORLD AREA FORECAST CENTRE AND BY A REGIONAL AREA FORECAST CENTRE

(See 3.2.1 and 3.3.1 of this Annex)

PART 1 — PROCEDURES TO BE FOLLOWED BY A WORLD AREA FORECAST CENTRE

The procedures to be followed by a world area forecast centre (WAFC) should include the following:

- a) maintenance of adequate communications links with the other WAFC and with its associated regional area forecast centres (RAFCs);
- b) procedures to establish quickly, on short notice, adequate communications links with other (non-associated) RAFCs, either directly or through an associated RAFC, in case of failure of the other WAFC;
- c) procedures to receive, store and quality-control global surface and upper-air basic meteorological data, both synoptic and asynoptic, including satellite (polar-orbiting and geostationary) data and aircraft meteorological reports;
- d) procedures to analyse the data received, to process into forecasts, and to further process and encode as required for transmission to associated RAFCs;
- e) procedures to monitor continuously incoming data, to compare with previously issued forecasts, and to prepare and issue amendments as required;
- f) procedures to notify associated RAFCs and the other WAFC of break-down of essential data processing or communications capability, so that back-up procedures may be put into effect;
- g) procedures to ensure effective communication with the other WAFC and with both associated and non-associated RAFCs on procedural, technical, and administrative matters as necessary for adequate functioning of the world area forecast system.

PART 2 — PROCEDURES TO BE FOLLOWED BY A REGIONAL AREA FORECAST CENTRE

While the development of detailed procedures to carry out the functions of the regional area forecast centres (RAFCs) would differ from State to State and is the province of the authority concerned, in consultation with its associated world area forecast centre (WAFC) and/or with the Contracting States served, the general procedures should include but may not necessarily be limited to:

- a) maintenance of communications links of required capacity with its associated WAFC and with other RAFCs as necessary, and users as agreed;
- b) procedures to establish quickly, on short notice, communications links as necessary in the event of communications or data processing failure of its associated WAFC;
- c) procedures to receive basic synoptic and asynoptic data, including satellite (polar-orbiting and geostationary) data and aircraft meteorological reports;
- d) procedures to analyse the data received, to process into forecasts of significant weather, and to supply these forecasts as agreed between the RAFC and its associated users;
- e) procedures to monitor continuously data received under c) above, to prepare and issue amendments to significant weather forecasts and other WAFC products as necessary, and to notify the associated WAFC immediately of the content of and reasons for any amendments it has issued to the forecast received from the WAFC;
- f) procedures to supply upper-air forecasts as agreed between the RAFC and its associated users;
- g) procedures to supply, as agreed, amendments to forecast upper-air data received from its associated WAFC;

- h) procedures to notify the associated WAFC, other RAFCs concerned and users within its service area of breakdown in essential data processing or communications capability, so that back-up procedures may be put into effect;
 - i) procedures to ensure effective communications with its associated WAFC and, as required, with other RAFCs on procedural, technical and administrative matters as necessary for adequate functioning of the world area forecast system; and
 - j) procedures to establish rapidly, according to agreements between States and users, the necessary communications means in case of a breakdown in normal communications.
-

ATTACHMENT B. GUIDANCE ON AREA FORECASTS IN ABBREVIATED PLAIN LANGUAGE

(See 3.2.7, 3.3.1 and 3.3.9 of this Annex)

PART 1 — FORMAT FOR ABBREVIATED PLAIN-LANGUAGE SIGNIFICANT WEATHER FORECAST MESSAGES AND AMENDMENTS THERETO TO SERVE INTERNATIONAL CIVIL AVIATION IN OPERATIONS ABOVE FLIGHT LEVEL 250

1. Specifications

1.1 For the purpose of these instructions, “abbreviated plain language” refers to a language conveying to aeronautical personnel a directly intelligible meaning through the use of abbreviations (except signals of the Q code) approved by ICAO and numerical values of self-explanatory nature supplemented, if suitable ICAO-approved abbreviations are not available, by other words taken with their usual meaning in aviation.

Note.— ICAO-approved abbreviations are published in ICAO Document 8400, Procedures for Air Navigation Services — ICAO Abbreviations and Codes. Signals of the Q code should not be used in abbreviated plain-language significant weather area forecast messages.

1.2 In abbreviated plain-language significant weather forecast messages, the term “CB” should be understood to include pertinent weather phenomena normally associated with cumulonimbus, namely thunderstorms, moderate or severe turbulence, moderate or severe icing, and hail.

1.3 An abbreviated plain-language significant weather forecast message should be consistent with the significant weather forecast chart from which it was derived.

1.4 The format should be as follows:

- a) World Meteorological Organization abbreviated heading.
- b) Type of message; applicable vertical range; valid time; area to which the forecast message relates. Describe the forecast area by reference to latitude, to longitude, to latitude/longitude co-ordinates, to major geographical features, or to any combination thereof. Describe, in the same manner, any part of the area for which a significant weather forecast cannot be given because of lack of data.
- c) Synopsis. Include descriptions of significant weather features, such as tropical cyclones, surface positions of frontal systems and well-defined convergence zones;

their forecast positions; their speed and direction of movement; and intensification or weakening, if considered significant. Give forecast positions as in b). Describe direction of movement in terms of eight points of the compass related to true north; give speed of movement in knots.

- d) Significant weather phenomena. Describe areas as in b). Describe the amount of cumulonimbus as ISOL EMBD CB (individual embedded cumulonimbus) or ISOL CB IN HAZE (individual cumulonimbus concealed in haze); OCNL EMBD CB (well separated embedded cumulonimbus) or OCNL CB IN HAZE (well separated cumulonimbus concealed in haze); or FRQ CB (cumulonimbus clouds with little or no separation). Describe cumulonimbus clouds contained in layers of other clouds as EMBD. Give bases and tops of significant weather phenomena as flight level (FL). If no significant weather is forecast, enter the term “SIGWX NIL”.

Note 1.— Give bases of significant weather phenomena only if expected to be at or above the lowest level of the atmosphere for which the forecast is prepared. Similarly, give the tops of significant weather phenomena only if expected to be at or below the highest level of the atmosphere for which the forecast is prepared.

Note 2.— Include turbulence not associated with cumulonimbus in separate section as described below.

- e) Turbulence. This should include turbulence, other than that associated with cumulonimbus, if expected to be moderate or severe, and the intensity thereof. Describe areas as in b). Give bases and tops of phenomenon as FL. If no turbulence in this category is forecast, no entry for turbulence should be given.

Note.— See Note 1 under 1.4 d) for similar application.

2. Examples

Examples of abbreviated plain-language significant weather messages are given on the following page.

Example 1

FAPN13 KWBC 101200

AREA FCST FL250 TO FL450 VALID 110000 FOR AREA 37N135E 48N108W 28N130W 28N158E 37N135E.

SYNOPSIS. COLD FRONT 45N179W 33N179W MOV E 20 KT. COLD FRONT 43N152W 44N140W 35N131W 29N134W MOV NE 15 KT INTSF.

SIGWX NIL

TURB. MOD CAT FL260 TO FL340 36N140E 36N150E 34N141E 36N140E. MOD CAT FL280 TO FL380 41N133W 45N125W 42N117W 40N120W 41N133W.

Example 2

FAEWI EJJJ 101300

AREA FCST FL250 TO FL450 VALID 110000 FOR AREA 50N20W 50N20E 30N20E 30N20W 50N20W.

SYNOPSIS. NO MAJOR WX SYSTEM.

SIGWX NIL.

Example 3

FANT10 KWBC 101200

AREA FCST FL250 TO FL600 VALID 110000 FOR AREA 55N88W 50N42E 33N13E 27N59W 55N88W.

SYNOPSIS. WARM FRONT 42N84W 43N79W 39N62W MOV NE 30 KT. OCCLUDED FRONT 63N40W 60N25W 50N29W MOV E 35 KT. COLD FRONT 50N29W 40N43W 31N60W MOV SE 10 KT INTSF.

SIGWX AND ASSOCIATED CLD. ISOL EMBD CB TOPS FL340 55N20E 55N30E 46N34E 44N24E 55N20E.

TURB. MOD CAT FL250 TO FL340 46N41W 53N40W 56N28W 50N32W 46N41W. MOD CAT FL250 TO FL350 62N30W 67N13W 63N08W 61N20W 62N30W.

Example 4

FANT10 KWBC 101400 AMD
AMD AREA FCST FL250 TO FL600 VALID 110000 FOR AREA 55N88W 50N42E 33N13E 27N59W 55N88W.

SYNOPSIS. NO MAJOR WX SYSTEM.

SIGWX AND ASSOCIATED CLD. FRQ CB TOPS FL480 48N80W 46N65W 41N65W 45N79W 48N80W.

OTHER AMD NIL.

Example 5

FAXT1 KWBC 101200
AREA FCST FL250 TO FL600 VALID 110000 FOR AREA 50N160W 50N43W 20S43W 20S160W 50N160W. FCST NIL
FOR AREA SOUTH OF EQUATOR DUE LACK OF DATA.

SYNOPSIS. WARM FRONT 41N85W 43N80W 39N70W 39N61W MOV NE 30 KT. COLD FRONT 41N85W 29N94W
MOV SE 25 KT. STNR FRONT 40N43W 30N63W. COLD FRONT 49N132W 45N130W 40N133W 30N144W MOV NE
15 KT INTSF.

SIGWX NIL.

TURB. MOD CAT FL280 TO FL380 41N116W 44N120W 45N125W 43N130W 42N133W 41N130W 39N116W
41N116W. MOD CAT FL280 TO FL380 44N105W 41N109W 39N105W 44N105W. MOD CAT FL240 TO FL350
50N70W 50N81W 44N87W 42N85W 45N75W 48N70W 50N70W.

**PART 2 — FORMAT FOR ABBREVIATED PLAIN-LANGUAGE SIGNIFICANT WEATHER FORECAST MESSAGES
AND AMENDMENTS THERETO TO SERVE INTERNATIONAL CIVIL AVIATION
IN OPERATIONS BETWEEN FLIGHT LEVELS 100 AND 250**

1. Specifications

1.1 For the purpose of these instructions, “abbreviated plain language” refers to a language conveying to aeronautical personnel a directly intelligible meaning through the use of abbreviations (except signals of the Q code) approved by ICAO and numerical values of self-explanatory nature supplemented, if suitable ICAO-approved abbreviations are not available, by other words taken with their usual meaning in aviation.

Note.— ICAO-approved abbreviations are published in ICAO Document 8400, Procedures for Air Navigation Services — ICAO Abbreviations and Codes. *Signals of the Q code should not be used in abbreviated plain-language significant weather area forecast messages.*

1.2 In abbreviated plain-language significant weather forecast messages, the term “CB” should be understood to include pertinent weather phenomena normally associated with cumulonimbus, namely thunderstorms, moderate or severe turbulence, moderate or severe icing, and hail.

1.3 An abbreviated plain-language significant weather forecast message should be consistent with the significant weather forecast chart from which it was derived.

1.4 The format should be as follows:

- a) World Meteorological Organization abbreviated heading.
- b) Type of message; applicable vertical range; valid time; area to which the forecast message relates. Describe the forecast area by reference to latitude, to longitude, to latitude/longitude co-ordinates, to major geographical features, or to any combination thereof. Describe, in the same manner, any part of the area for which a significant weather forecast cannot be given because of lack of data.
- c) Synopsis. Include descriptions of significant weather features, such as tropical cyclones, surface positions of frontal systems and well-defined convergence zones; their forecast positions; their speed and direction of movement; and intensification or weakening, if considered significant. Give forecast positions as in b). Describe direction of movement in terms of eight points of the compass related to true north; give speed of movement in knots.
- d) Significant weather phenomena and associated clouds. Describe areas as in b). Give cloud amounts, except for cumulonimbus clouds, in terms of SCT (1 to 4 oktas),

BKN (5 to 7 oktas), or OVC (8 oktas). Describe the amount of cumulonimbus as ISOL EMBD CB (individual embedded cumulonimbus) or ISOL CB IN HAZE (individual cumulonimbus concealed in haze); OCNL EMBD CB (well separated embedded cumulonimbus) or OCNL CB IN HAZE (well separated cumulonimbus concealed in haze); or FRQ CB (cumulonimbus clouds with little or no separation). Describe cumulonimbus clouds contained in layers of other clouds as EMBD. Give bases and tops of significant weather phenomena and associated clouds as flight level (FL). If no significant weather is forecast, enter the term “SIGWX NIL”.

Note.— Include icing and turbulence not associated with cumulonimbus in separate sections as described below.

- e) Turbulence. This should include turbulence, other than that associated with cumulonimbus, if expected to be moderate or severe, and the intensity thereof. Describe areas as in b). Give bases and tops of phenomenon as FL. If no turbulence in this category is forecast, no entry for turbulence should be given.
- f) Icing. This should include icing, other than that associated with cumulonimbus, if expected to be moderate or severe, and the intensity thereof. Should also include icing in area(s) of forecast, freezing precipitation. Describe areas as in b). Give bases and tops of phenomenon as FL. If aircraft icing, other than that associated with cumulonimbus, is not forecast, no entry for icing should be given.
- g) Freezing level. Include height of the 0°C isotherm, if expected to be within the layer of the atmosphere for which the forecast is prepared. Express height as FL. If not applicable, do not include entry or entries for freezing level.

Note.— Give bases of significant weather phenomena (and associated clouds, if any) only if expected to be at or above the lowest level of the atmosphere for which the forecast is prepared. Similarly, give the tops of significant weather phenomena (and associated clouds, if any) only if expected to be at or below the highest level of the atmosphere for which the forecast is prepared.

2. Examples

Examples of abbreviated plain-language significant weather messages are given on the following page.

Example 1

FAPN16 KWBC 101200

AREA FCST FL100 TO FL250 VALID 110000 FOR AREA 37N135E 48N108W 28N130W 28N158E 37N135E.

SYNOPSIS. COLD FRONT 45N179W 33N179W MOV E 20 KT. COLD FRONT 43N152W 44N140W 35N131W 29N134W MOV NE 15 KT INTSF.

SIGWX NIL

ICE. MOD ICE INC FL100 TO FL180 42N140W 46N145W 47N138W 42N140W.

FZ LEVEL. FL120 29N157E BECOMING FL100 32N175E 35N165W 40N135W 42N110W.

Example 2

FANT14 KWBC 101200

AREA FCST FL100 TO FL250 VALID 110000 FOR AREA 55N88W 50N42E 33N13E 27N59W 55N88W.

SYNOPSIS. WARM FRONT 42N84W 43N79W 39N62W MOV NE 30 KT. OCCLUDED FRONT 63N40W 60N25W 50N29W MOV E 35 KT. COLD FRONT 40N29W 40N43W 31N60W MOV SE 10 KT INTSF.

SIGWX AND ASSOCIATED CLD. ISOL EMBD CB 44N20E 55N30E 46N34E 44N24E 44N20E.

TURB. MOD CAT BASE FL240 47N41W 53N40W 56N28W 50N32W 47N41W. MOD CAT BASE FL250 62N30W 67N13W 63N08W 61N20W 62N30W.

ICE. MOD ICE INC FL100 TO FL130 55N03W 49N08W 43N00W 44N10E 50N14E 55N03E.

FZ LEVEL. FL120 35N30W FL110 42N20W FL100 43N10W 43N00W 40N10E 35N15E.

Example 3

FANT14 KWBC 101400 AMD

AMD AREA FCST FL100 TO FL250 VALID 110000 FOR AREA 55N88W 40N42E 33N13E 27N59W 55N88W.

SYNOPSIS. WARM FRONT 42N84W 43N79W 39N62W MOV NE 10 KT INTSF.

SIGWX AND ASSOCIATED CLD. FRQ CB 48N80W 46N65W 41N65W 45N79W 48N80W INTSF.

OTHER AMD NIL.

PART 3 — FORMAT FOR MESSAGES CONTAINING ABBREVIATED PLAIN-LANGUAGE AMENDMENTS TO UPPER-AIR FORECASTS

1. Specifications

1.1 For the purpose of these instructions, “abbreviated plain language” refers to a language conveying to aeronautical personnel a directly intelligible meaning through the use of abbreviations (except signals of the Q code) approved by the International Civil Aviation Organization (ICAO) and numerical values of self-explanatory nature supplemented, if suitable ICAO-approved abbreviations are not available, by other words taken with their usual meaning in aviation.

Note.— ICAO-approved abbreviations are published in ICAO Document 8400, Procedures for Air Navigation Services — ICAO Abbreviations and Codes. Signals of the Q code should not be used in abbreviated plain-language messages issued as amendments to relevant upper-air wind and temperature forecasts.

1.2 Abbreviated plain-language amendments to upper-air forecasts should be understood to apply to all relevant forecasts prepared by world and regional area forecast centres for any specified area, level and valid time(s). Such forecasts could include meteorological charts, grid point data in numerical form and grid point data in digital form.

1.3 The area and levels for which amendments to upper-air forecasts are to be issued should be described with regard to horizontal dimensions by applicable latitude/longitude co-ordinates and with regard to vertical dimensions by applicable ICAO flight levels related to standard constant pressure surfaces.

1.4 To minimize the possibility of misinterpretation of the amendments, the procedures given below should be followed:

- a) amendments should be issued in abbreviated plain language as an amended area forecast under a World Meteorological Organization abbreviated heading, using as date time group the standard time of observation in GMT on which the original forecast was based;
- b) the amendment criteria given by Annex 3, 3.2.6 and 3.3.10, should be followed;
- c) the valid time(s) to which an amendment is intended to apply should be given in terms of 12, 18, 24 and/or 30 hours following the standard time in GMT on which the original forecast was based;
- d) the area to which an amendment to be issued is intended to apply should be described as a four-sided polygon in terms of latitude/longitude intersections giving corner co-ordinates of the polygon. To minimize the risk of misinterpretation, the corner co-ordinates should be given in a clockwise or counter-clockwise sequence. Latitude should be given in whole degrees (two digits) followed by N (north) or S (south). Longitude should be given in whole degrees (three digits) followed by E (east) or W (west);
- e) the ICAO flight levels to which an amendment is intended to apply should be given in the text of the amendment messages;
- f) amendments to forecasts of wind speed should be given in terms of percentage increase, using three digits (010, 020, 030, 120 and so forth) preceded by PS (plus) or of percentage decrease (010, 020, 030 and so forth up to a maximum decrease of 099) preceded by MS (minus);
- g) amendments to forecasts of wind direction should be given in terms of clockwise or counter-clockwise rotation from the forecast being amended, using three digits (010, 020 and so forth up to 180) preceded by CW (for clockwise) or CC (for counter-clockwise); and
- h) amendments to upper-air temperature forecasts should be given in three digits as absolute increases or decreases, in degrees Celsius, preceded by PS (plus) or MS (minus).

Note.— No entry should be made for any feature for which an amendment is not being issued.

2. Examples

2.1 Examples of messages containing amendments to upper-air forecasts are given on the following page.

Example 1

FXPA1 KWBC 241200 AMD
AMD AREA FCST

SPEED CHANGE PER CENT INCR (PS) OR DECR (MS).
DIRECTION CHANGE CLOCKWISE (CW) OR COUNTER-CLOCKWISE (CC).
TEMPERATURE CHANGE ABSOLUTE INCR (PS) OR DECR (MS).

AMEND WIND AND TEMPERATURE FORECAST IN AREA 38N160E 46N160E 47N178W 35N178W.
AMENDMENT VALID 18 HR 24 HR AND 30 HR AFTER 241200.

AMENDMENT FOR	FL250	FL300	FL340	FL390
WIND SPEED/PER CENT	PS035	PS035	PS035	PS035
WIND DIRECTION/DEG	CC020	CC020	CC020	CC020
TEMPERATURE/DEG C	PS005	PS005	PS005	PS005

AMEND WIND AND TEMPERATURE FORECAST IN AREA 47N177W 40N161W 30N161W 35N177W.
AMENDMENT VALID 18 HR 24 HR AND 30 HR AFTER 241200.

AMENDMENT FOR	FL250	FL300	FL340	FL390
WIND SPEED/PER CENT	MS025	MS040	MS050	MS040

Example 2

FXPA2 KWBC 241200 AMD
AMD AREA FCST

SPEED CHANGE PER CENT INCR (PS) OR DECR (MS).
DIRECTION CHANGE CLOCKWISE (CW) OR COUNTER-CLOCKWISE (CC).
TEMPERATURE CHANGE ABSOLUTE INCR (PS) OR DECR (MS).

AMEND WIND AND TEMPERATURE FORECAST IN AREA 33N143E 43N147E 45N159E 33N159E.
AMENDMENT VALID 18 HR AND 24 HR AFTER 241200.

AMENDMENT FOR	FL250	FL300	FL340	FL390
WIND SPEED/PER CENT	PS040	PS050	PS070	PS050
WIND DIRECTION/DEG	CW020	CW020	CW020	CW020
TEMPERATURE/DEG C	MS005	MS008	MS010	MS008

ATTACHMENT C. OPERATIONALLY DESIRABLE AND CURRENTLY ATTAINABLE ACCURACY OF MEASUREMENT OR OBSERVATION

*Note.— The guidance contained in this table relates to Chapter 4 —
Meteorological observations and reports, in particular to 4.1.10.*

<i>Element to be observed</i>	<i>Operationally desirable accuracy of measurement or observation</i>	<i>Currently attainable* accuracy of measurement or observation</i>
Mean surface wind	Direction: $\pm 10^\circ$ Speed: ± 1 kt up to 10 kt $\pm 10\%$ above 10 kt	Direction: $\pm 10^\circ$ Speed: ± 2 kt up to 20 kt $\pm 10\%$ above 20 kt
Variations from the mean surface wind	± 2 kt, in terms of longitudinal and lateral components	± 2 kt
Visibility	± 50 m up to 500 m $\pm 10\%$ between 500 m and 1 500 m $\pm 20\%$ above 1 500 m	± 100 m up to 1 000 m** ± 200 m between 1 000 m and 2 000 m $\pm 20\%$ above 2 000 m up to 10 km
Runway visual range	± 25 m up to 150 m ± 50 m between 150 m and 500 m ± 100 m between 500 m and 1 000 m ± 200 m above 1 000 m	± 50 m up to 500 m** ± 100 m between 500 m and 1 000 m ± 200 m above 1 000 m up to 2 000 m
Cloud amount	± 1 okta	In daylight an observer can attain an accuracy of ± 1 okta at the point of observation. In darkness, and when atmospheric phenomena limit the viewing of low cloud, there will be difficulty in attaining that accuracy.
Cloud height	± 15 m (50 ft) up to 150 m (500 ft) $\pm 10\%$ between 150 m (500 ft) and 300 m (1 000 ft) $\pm 20\%$ above 300 m (1 000 ft)	± 30 m (100 ft) up to 1 000 m (3 300 ft)** $\pm 5\%$ to 10% above 1 000 m (3 300 ft)
Air temperature and dew point temperature	$\pm 1^\circ\text{C}$	$\pm 1^\circ\text{C}$
Pressure value (QNH, QFE)	± 0.5 mb	± 0.5 mb

* "Currently attainable" refers to early 1974.

** The accuracy stated here refers to instrumental measurement; it is not normally attainable in observations made without the aid of instruments.

ATTACHMENT D. CONVERSION OF TRANSMISSOMETER READINGS INTO RUNWAY VISUAL RANGE

(See 4.7.7 of this Annex)

1. The conversion of transmissometer readings into runway visual range is based on Koschmieder's Law or Allard's Law, depending on whether the pilot can be expected to obtain his main visual guidance from the runway and its markings or from the runway lights. In the interest of standardization in runway visual range assessments, this Attachment provides guidance on the use and application of the main conversion factors to be used in these computations.

2. In Koschmieder's Law one of the factors to be taken into account is the pilot contrast threshold. The agreed constant to be used for this is 0.05 (dimensionless).

3. In Allard's Law the corresponding factor is the illumination threshold. This is not a constant, but a continuous function dependent on the background luminance. The agreed relationship to be used in transmissometer systems with

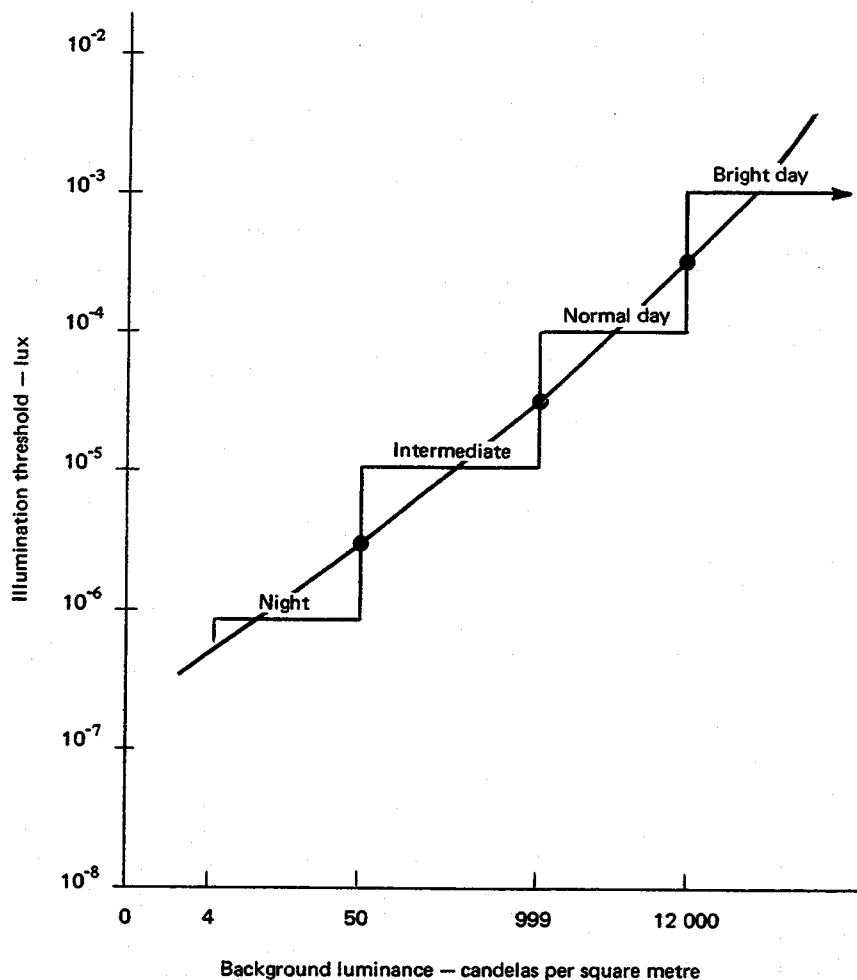


Figure D-1.

continuous adjustment of the illumination threshold by a background luminance sensor is shown by the curve in Figure D-1.

4. In transmissometer systems without continuous adjustment of the illumination threshold, the use of four equally spaced illumination threshold values with agreed corresponding background luminance ranges is convenient. The four values are shown in Figure D-1 in the form of a step function; they are tabulated in Table D-1 for greater clarity.

5. In transmissometer systems of the kind referred to in 4 above, values for illumination threshold other than those

indicated by the step function and by Table D-1 may be used, provided they give corresponding or slightly lower values of runway visual range. The number of illumination threshold values to be used at any location will depend on the frequency of occurrence and on the duration of various levels of background luminance. For example, in some areas two values may be found adequate.

Note.— Information and guidance material on the runway lights to be used for assessment of runway visual range are contained in the ICAO Manual of Runway Visual Range Observing and Reporting Practices (Doc 9328-AN/908).

Table D-1

	<i>Illumination threshold</i>	<i>Background luminance</i>
Night	8×10^{-7} lux	4 — 50 cd/m ²
Intermediate value	10^{-5} lux	51 — 999 cd/m ²
Normal day	10^{-4} lux	1 000 — 12 000 cd/m ²
Bright day (e.g. sunlit fog)	10^{-3} lux	more than 12 000 cd/m ²

ATTACHMENT E. OPERATIONALLY DESIRABLE ACCURACY OF FORECASTS

Note 1.— The guidance contained in this table relates to Chapter 6 — Forecasts, in particular to 6.1.1.

Note 2.— If the accuracy of the forecasts remains within the operationally desirable range shown in the second column, for the percentage of cases indicated in the third column, the effect of forecast errors is not considered serious in comparison with the effects of navigational errors and of other operational uncertainties.

<i>Element to be forecast</i>	<i>Operationally desirable accuracy of forecasts</i>	<i>Minimum percentage of cases within range</i>
AERODROME FORECAST		
Wind direction	± 30°	80% of cases
Wind speed	± 5 kt up to 25 kt ± 20% above 25 kt	80% of cases
Visibility	± 200 m up to 700 m ± 30% between 700 m and 10 km	80% of cases
Precipitation	Occurrence or non-occurrence	80% of cases
Cloud amount	± 2 oktas	70% of cases
Cloud height	± 30 m (100 ft) up to 120 m (400 ft) ± 30% between 120 m (400 ft) and 3 000 m (10 000 ft)	70% of cases
Air temperature	± 1°C	70% of cases
LANDING FORECAST		
Wind direction	± 30°	90% of cases
Wind speed	± 5 kt up to 25 kt ± 20% above 25 kt	90% of cases
Visibility	± 200 m up to 700 m ± 30% between 700 m and 10 km	90% of cases
Precipitation	Occurrence or non-occurrence	90% of cases
Cloud amount	± 2 oktas	90% of cases
Cloud height	± 30 m (100 ft) up to 120 m (400 ft) ± 30% between 120 m (400 ft) and 3 000 m (10 000 ft)	90% of cases

<i>Element to be forecast</i>	<i>Operationally desirable accuracy of forecasts</i>	<i>Minimum percentage of cases within range</i>
FORECAST FOR TAKE-OFF		
Wind direction	$\pm 30^\circ$	90% of cases
Wind speed	± 5 kt up to 25 kt $\pm 20\%$ above 25 kt	90% of cases
Air temperature	$\pm 1^\circ\text{C}$	90% of cases
Pressure value (QNH)	± 1 mb	90% of cases
AREA, FLIGHT AND ROUTE FORECASTS		
Upper-air temperature	$\pm 3^\circ\text{C}$ (Mean for 900 km/500 NM)	90% of cases
Upper wind	± 15 kt up to flight level 250 ± 20 kt above flight level 250 (Modulus of vector difference for 900 km/500 NM)	90% of cases
Significant en-route weather phenomena and cloud	Occurrence or non-occurrence	80% of cases
	Location: ± 100 km/60 NM	70% of cases
	Vertical extent: ± 600 m/2 000 ft	70% of cases

— END —

ICAO TECHNICAL PUBLICATIONS

The following summary gives the status, and also describes in general terms the contents of the various series of technical publications issued by the International Civil Aviation Organization. It does not include specialized publications that do not fall specifically within one of the series, such as the Aeronautical Chart Catalogue or the Meteorological Tables for International Air Navigation.

International Standards and Recommended Practices are adopted by the Council in accordance with Articles 54, 37 and 90 of the Convention on International Civil Aviation and are designated, for convenience, as Annexes to the Convention. The uniform application by Contracting States of the specifications contained in the International Standards is recognized as necessary for the safety or regularity of international air navigation while the uniform application of the specifications in the Recommended Practices is regarded as desirable in the interest of safety, regularity or efficiency of international air navigation. Knowledge of any differences between the national regulations or practices of a State and those established by an International Standard is essential to the safety or regularity of international air navigation. In the event of non-compliance with an International Standard, a State has, in fact, an obligation, under Article 38 of the Convention, to notify the Council of any differences. Knowledge of differences from Recommended Practices may also be important for the safety of air navigation and, although the Convention does not impose any obligation with regard thereto, the Council has invited Contracting States to notify such differences in addition to those relating to International Standards.

Procedures for Air Navigation Services (PANS) are approved by the Council for world-wide application. They contain, for the most part, operating procedures

regarded as not yet having attained a sufficient degree of maturity for adoption as International Standards and Recommended Practices, as well as material of a more permanent character which is considered too detailed for incorporation in an Annex, or is susceptible to frequent amendment, for which the processes of the Convention would be too cumbersome.

Regional Supplementary Procedures (SUPPS) have a status similar to that of PANS in that they are approved by the Council, but only for application in the respective regions. They are prepared in consolidated form, since certain of the procedures apply to overlapping regions or are common to two or more regions.

The following publications are prepared by authority of the Secretary General in accordance with the principles and policies approved by the Council.

Technical Manuals provide guidance and information in amplification of the International Standards, Recommended Practices and PANS, the implementation of which they are designed to facilitate.

Air Navigation Plans detail requirements for facilities and services for international air navigation in the respective ICAO Air Navigation Regions. They are prepared on the authority of the Secretary General on the basis of recommendations of regional air navigation meetings and of the Council action thereon. The plans are amended periodically to reflect changes in requirements and in the status of implementation of the recommended facilities and services.

ICAO Circulars make available specialized information of interest to Contracting States. This includes studies on technical subjects.

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